

ALLPORT (F.)

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Thrombosis of the Cerebral Veins and
Sinuses Following Ear Disease.

BY
FRANK ALLPORT, M.D.,

OF MINNEAPOLIS, MINN.,
PROFESSOR OF CLINICAL OPHTHALMOLOGY AND OTOTOLOGY IN THE UNIVER-
SITY OF MINNESOTA, ETC.



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PURULENT BRAIN DEPOSITS, AND PHLEBITIS AND THROMBOSIS OF THE CEREBRAL VEINS AND SINUSES FOLLOWING EAR DISEASE.

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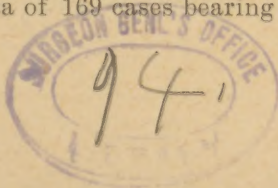
PROFESSOR OF CLINICAL OPHTHALMOLOGY AND OTOTOLOGY IN THE UNIVERSITY OF MINNESOTA, ETC.

A few years ago, when the mastoid process was first opened for the liberation of pus contained within its walls, it was regarded as an extremely hazardous procedure, necessitating the highest skill, and unwarrantable except as a *dernier resort*.

As the anatomical and pathological bearings of the disease become better understood, the operation assumed a less formidable appearance, and the process is now opened sufficiently early to save most cases of this nature.

Intra-cranial lesions following aural affections have a somewhat similar history, but our knowledge and plans of procedure are still in a primitive condition, and not sufficiently crystallized to warrant a sense of security, when radical and positive steps appear to be indicated.

With the hope of somewhat systematizing our present knowledge of this subject, I have been to the pains of collecting the data of 169 cases bearing on



the topic, and no case has been admitted to this series unless one of two circumstances has been fulfilled:

1. The patient must have had an ear difficulty, resulting in intra-cranial trouble, death, and an autopsy; or,

2. The patient must have had an ear difficulty, resulting in intra-cranial trouble, and the intra-cranial cavity been exposed by operation.

By carefully systematizing these cases, I think a fairly comprehensive idea of the subject may be obtained.

Case 1.—Treated by Frank Allport, of Minneapolis, Minn. Mrs. C. W., aged twenty-five. At three years of age she had scarlet fever, resulting in acute purulent otitis on the left side, which subsequently became chronic. The suppuration continued up to her death. Years ago she suffered an acute exacerbation with a mastoid pain, relieved by counter-irritation over the mastoid. Since then she has had occasional ear-aches, but nothing decisive in its character until January 28, 1883. A few days previously she contracted a severe cold, centering in her ear, and accompanied by intense ear-ache.

I found a meatus almost imperforate from bony hypertrophy. Consequently, only the extreme outer portion of the canal was visible; therefore, the middle ear could be neither seen nor treated. The discharge was offensive, and evidently largely retained, owing to the hypertrophy of the meatus. There was no pain, redness or swelling of the mastoid. Pulse and temperature slightly advanced.

Rest, quiet and hot water douching were employed.

Feb. 2. The pain being worse and the meatus inflamed, the tissues lining the meatus were freely incised down to the bone. Improvement followed.

Feb. 10. The pain had been increasing, and was now excessive. It extended from the ear to the tem-

poral and parietal regions, but did not involve the mastoid.

Feb. 13. Drs. Spring and Fulton were called in consultation. It was decided to open the mastoid. This was done Feb. 14, and large quantities of very fetid pus evacuated.

Great improvement followed. The discharge from the ear was much diminished.

Feb. 16. The pain in her head returned, and was referred principally to the frontal and parietal regions.

Feb. 22. She had a chill, during which, a sudden and free gush of pus occurred from the mastoid opening, after which she grew rapidly better.

Feb. 27. The pain recurred, and continued until March 1, when it subsided upon another free and sudden gush of pus from the mastoid opening.

March 7, the same phenomenon recurred; March 14, the severe pain returned; March 16, Drs. Spring, Fulton and myself met in consultation, and decided to enlarge and lower the mastoid opening, fearing the drainage was insufficient.

This was done March 17. In the course of the operation, a sinus was discovered within the boundaries of the mastoid opening, leading into the cerebellum. The sinus was about one-fourth of an inch wide.

March 20. Drs. Spring, Fulton, Abbott, Johnson and myself met in consultation.

March 23. Severe pain in the frontal and parietal regions appeared. In the evening she had a chill.

March 24. Some delirium. The same physicians were called in consultation. The blunt canula of an aspirating syringe was inserted into the sinus and into the cranial cavity. No pus was found. Pain, restlessness and nervousness now continued until the termination of the case.

March 28. In pressing upon the temple, it was

noticed that pus was forced into the mastoid opening. A sinus was found extending over the squamous portion of the temporal bone, and terminating in the region of the zygomatic arch. The sinus was kept drained with a tube, and washed with peroxide of hydrogen.

April 2. A peaceful death.

Her pulse and temperature were never very high. Her pulse ranged from 80 to 108, and her temperature from $98\frac{1}{2}^{\circ}$ to $103\frac{1}{2}^{\circ}$. It did not often exceed 101° .

Autopsy.—Drs. Spring, Fulton, Abbott, Johnson, Hill, Wells and myself being present. Extensive necrosis was found outside of the skull, extending from the outer surface of the mastoid to the squamous portion of the temporal bone, extending over the frontal bone and to the superior maxilla down below the zygomatic arch. The soft parts were separated from the bone over this entire area, and considerable quantities of pus followed the diseased tract.

We found that the sinus we had discovered in the course of the operation did, in fact, open into the cerebellum through the inner mastoid plate, but no pus had accumulated at this region.

The outer portion of the squamous portion of the temporal bone was almost entirely destroyed by necrosis. No fluctuation, redness or swelling indicated this before death. A large opening existed in the squamous bone, connecting directly with the cranial cavity. The external diffused abscess at this point extended from the entire squamous portion of the temporal bone down to below the zygoma, and as far forward as two inches in front of the ear. Extending over this territory, the soft parts were completely lifted from the bones, which were generally blackened from necrosis.

The inner surface of the temporal bone was badly

necrosed, especially at four points—1, the squamous portion; 2, the upper part of the petrous portion; 3, the petrous portion corresponding to the middle and internal ears; and 4, the inner plate of the mastoid. The petrous bone was so softened in many places as to be easily scraped up like so much wet sand. A large, carious opening connected the middle and internal ears and the cranial cavity. An opening existed through the mastoid, just in front of the lateral sinus.

There was a general injection of the entire brain tissue, especially in the tempero-sphenoidal lobe. The left side of the brain was much flattened, and the resulting space filled up with pus.

Pus deposits were also found in the first frontal fissure, in the first frontal convolution, in the fissure of Rolando, in the middle lobe on the right side, and in both lateral ventricles.

There were enormous pus deposits in the region of the medulla and pons.

The cerebellum was much softened by purulent infiltration, and pus was found in its interior.

The patient's mental functions were practically unimpaired up to the time of her death.

Case 2.—Treated by Frank Allport, of Minneapolis, Minn. N. N., male, age twenty-three. Right ear. Acute purulent inflammation of the middle ear.

Was brought to the City Hospital September 16, 1889. Dr. Chase requested me to see him. There was pain in the ear and side of the head. Tenderness over the mastoid, but no swelling. Clouded intelligence. Pulse 64; temperature $103\frac{3}{5}$. Calomel and morphia were administered, and the ear frequently douched with hot water.

Sept. 17. The mastoid cells were opened, but no pus was found. The cells, however, were much softened and broken down, and a probe could be passed through the inner plate of the mastoid into the cra-

nial cavity. This was enlarged, but no pus was found.

It was determined to trephine the skull at another point, as it was evident that pus existed somewhere in the cranial cavity, owing to the profound cerebral symptoms, the carious opening through the inner mastoid plate, and the lack of pus in the mastoid cells. The directions of Barr were followed, and the opening made through the squamous portion of the temporal bone, just above the auricle. No pus was found. Another was then made back of the auricle, and involving both the mastoid and occipital bone. A small amount of pus was here found. The wounds were irrigated and dressed antiseptically. He died that evening. His pulse was always slow, and his temperature never extended above $103\frac{3}{5}^{\circ}$, and the morning of the operation it was subnormal. No evidence of any paralysis was observed in the case.

Autopsy.—This was made by Prof. W. A. Jones, Dr. Chase and myself. The dura-mater was adherent. There was a blood clot in the longitudinal sinus, and over the Sylvian fissure. Clotted blood extended over the parietal lobe backward to the occipital lobe. A large blood clot envelopes the temporal and sphenoidal lobes. A clot is found in the superior petrosal sinus, and in the right ventricle.

The right hemisphere is deeply congested; the left hemisphere slightly congested.

The medulla was bathed in pus. Abscess, and purulent meningitis of cerebellum.

There are carious openings through the petrous portion of the temporal bone connecting the cranial cavity with the middle and internal ears. A carious opening is found extending through the internal mastoid plate.

Case 3.—Treated by Frank Allport, of Minneapolis, Minn. F. J., male, age twenty-two. City Hospi-

tal case. Last June he had a fever, followed by an abscess of the right middle ear.

He came to my clinic at the University Dispensary, October 2, 1888, with a large mastoid swelling. This was opened and pus evacuated. I found a spontaneous opening through the external mastoid plate, which was enlarged. Pus was located in the cells. His pulse and temperature was somewhat heightened.

He went on to an uninterrupted recovery. January 25 he returned to the hospital with typhoid fever, and was treated by Prof. Dunn, the city physician. He died.

Autopsy by Prof. Jones, Prof. Dunn and myself. We found a venous congestion of the meninges. A thrombus was found in the posterior portion of the longitudinal sinus. Another thrombus was found in the lateral sinus. The dura-mater over the internal plate of the mastoid was much thickened and bound down by adhesions. The inner plate of the mastoid was thickened, darkened, porous and hard. The walls of the mastoid cells were hypertrophied. The cells were few in number.

The opening made in external plate was refilled with bony cicatricial tissue. The abdominal examination showed death by typhoid fever.

Case 4.—Treated by Frank Allport, of Minneapolis, Minn. J. M., male, age thirty-four. I was called to see him April 30, 1889, by Drs. Sweetzer and Hall.

I found him with a discharge from the right ear, with an accompanying acute inflammation. He has had chronic otorrhœa for a long time. He had pyæmic abscesses in various parts of his body. Temperature from 102 to 105; pulse averages about 140°. Is having chills. Has no paralytic symptoms. Has great pain in his head, but this disappeared several days before death. Mentality good, but is very nervous and excitable. Became unconscious just before

death, but not before. He had no mastoid symptoms. He died May 2.

Autopsy by Drs. Sweetzer, Hall and myself. The mastoid was unaffected. The middle ear was carious, and the ossicles had all disappeared. There was no carious connection between the mastoid, middle or internal ears, and the cranial cavity. We found a thrombus in the superior petrosal sinus, pus in the superior petrosal and lateral sinuses, necrosis in the lateral sinus and general meningitis

Case 5.—Treated by Frank Allport, of Minneapolis, Minn. J. F., male, age twenty-five. Was struck in the right ear while boxing. Came to the City Hospital Nov. 29. An examination of the ear, at the request of Dr. Dunn, disclosed some inspissated cerumen, which was removed. The drum-head was much inflamed and swollen. Hearing good. Drum-head lanced and pus evacuated. The hot douche was frequently used, and the patient kept in bed. He improved.

In about one week, after considerable pain in the ear and mastoid, a swelling appeared over the mastoid, accompanied by tenderness and some pain in the temporal and parietal regions. The discharge continued.

Dec. 10. The mastoid cells were opened, and pus liberated. Improvement followed until January 11, when the pain in the right side of the head reappeared, accompanied by slight pain and swelling in the neck, extending down from the mastoid process. These neck symptoms entirely disappeared in a few days. The bowels were loose.

Jan. 15. The mastoid opening was enlarged and improvement followed.

Jan. 29. Pain in the right side of the head again. Vomiting and delirium. Improvement until Feb. 10, when the pain reappeared. Delirium; coma and death.

He never had any paralytic symptoms. The temperature and pulse were never high, and the temperature was often sub-normal.

Autopsy by Prof. Hendricks Prof. Dunn and myself. There was a diffuse sub-dural abscess, most marked in the anterior parietal region anterior to the fissure of Rolando. A purulent thrombus existed in the superior longitudinal sinus. Firm adhesion existed between the arachnoid and pia-mater. There was pus on the surface of the right frontal convolution and the right temporal convolution. A small thrombus existed in the lateral sinus. There was a carious opening from the mastoid cells into the lateral sinus. The petrous bone was unaffected, with the exception of the purulent inflammation of the middle ear.

Case 6.—Treated by Frank Allport, of Minneapolis, Minn. C. B., Male, age thirty-five. Entered City Hospital December 7, 1888. I saw the case December 10, at the request of Prof. Dunn.

At the date of his admission he was obviously very sick and his mental condition was such as to render a thorough knowledge of his previous condition impossible. We learned, however, that his left ear had discharged for about three months, accompanied by severe head pains. He has had a diarrhoea and chills; his tongue was dry and coated; he was delirious, and had aphasia and incoherent speech; no paralysis; the auditory canal was full of pus; there were no mastoid symptoms; there was a swelling just under the mastoid process in the neck, about the size of a hen's egg, that was somewhat tender, but not fluctuating; the surface of his body was very hot and dry; his temperature varied from $102\frac{1}{2}$ to $103\frac{1}{2}$, and his pulse was from 104 to 120. He died December 11.

Autopsy by Professors Dunn, Jones and myself. The large vessels of the dura and pia-mater were filled with dark blood; the inferior surface of the

cerebellum is softened, discolored and purulent; the basilar artery and circle of Willis are filled with dark venous blood; the middle and internal ear contained foul thick pus; there is a purulent thrombus in the left petrosal sinus, both superior and inferior; there is a purulent thrombus in the lateral sinus and in the internal jugular vein; the external jugular vein for some distance down the neck shows evidences of purulent phlebitis; the vein from the auditory canal is in the same condition; pus is found in the semi-circular canals; there is a thrombus in the basilar vein; the superficial posterior auricular glands were found to be much enlarged; there was no pus in the mastoid cells.

Case 7.—*Archives of Otolaryngology*, 1885. Treated by A. Hedinger, of Stuttgart. Female, age sixty-three. Right ear. Came to Hedinger in 1874, with a history of chronic otorrhea. Fibrous tumor in meatus; numbness right side of neck and face; patient disappeared for years; came again in 1883; severe pain in ear; aural hemorrhages intermixed with pus; totally deaf in right ear; fibrous tumor still present; pain in back of head and temporal region; swelling of temporal region; moderate fever.

April 23. Temporal swelling incised and pus liberated; improvement. May 17. Incision in the cheek is made and pus liberated. June 19. Another incision over mastoid muscle and pus liberated. Oct. 30. Painful swelling over posterior part of mastoid process. Mastoid opened and pus liberated. Nov. 8. Delirium; right pupil contracted. Nov. 12. Stupor. Nov. 15. Total unconsciousness; spasms of left upper and lower extremities; left facial paresis. Nov. 17. Death.

Autopsy.—Multiple pus sinuses in the neck; carious spots on outside of mastoid and occipital bones; congestion of dura-mater and pia-mater; the right sigmoid sinus, bulbous portion of jugular vein, and

the mastoid emissory vein, all obliterated; tumor in middle ear; malleus and incus gone; pus in mastoid antrum; a carious canal leads from the mastoid antrum into a cavity in the sigmoid fossa; carious opening through the incisura sanctorini; caries of the pyramid; caries of the bony wall of transverse sinus.

Case 8.—*Archives of Otolaryngology*, 1885. Treated by A. Hedinger, of Stuttgart. Female, age fifty. Chronic otorrhœa, both ears. Vertigo, violent pain in the head, especially in occipital region. Temperature and pulse subnormal. Right ear contains polypus; removed. Left ear, chronic otorrhœa, simple. Received conservative treatment from Hedinger. **Treatment unavailing; coma; death.**

Autopsy.—Intense hyperæmia of all meningeal veins. In the center of the superior petrosal sinus is a small carious opening directly over the vestibule. Petrous bone carious. Pus in middle cranial fossa running into the canal of the medulla oblongata. Abscess in left posterior cranial fossa where cerebellum rests. Cholesteatoma in left mastoid antrum. Caries of semi-circular canal, vestibule and cochlea.

Case 9.—*Archives of Otolaryngology*, June, 1886. Treated by A. Truckenbrod. Male, age twenty-eight. Left ear, chronic otorrhœa. Has suffered from attacks of vertigo; has now chills; very painful spot on top of head; meatus narrowed; headaches; temperature rises moderately. Mastoid opened; found pus; improvement for a few days. Temperature rises again; pain in top of head and temple; paresis of right side of face; difficult speech; defective memory; aphasia. **Diagnosis. Brain abscess.**

Operation.—Fistula found in squamous bone directly above the meatus, which was enlarged. Search made for pus, which was found. Irrigation with sublimate solution 1-1,000. Sublimate gauze dressing; **drainage tube; recovery.**

The abscess was in the second left temporal convolution. The diagnosis was based on, 1. Oedema of this region; 2. Pain in this region; 3. Paralysis of right facial nerve.

Case 10.—*Lancet*, 1885, Vol. 2, page 665. Left ear. Treated by Hide Hilles. Chronic otorrhœa. Death.

Autopsy.—Cerebral meningitis. Abscess of left temporal lobe.

Case 11.—*Lancet*, May 15, 1880. Treated by James Allen. Female, age nineteen; right ear; chronic otorrhœa; deafness. Dec. 18, 1879. Ear-ache; entire head painful; vomiting; paraplegic; motor paralysis of lower limbs; scalp and spine very painful to touch. Death.

Autopsy.—Abscess beneath dura-mater on anterior surface of right petrous bone. Drum-head and ossicles destroyed. Pus in middle ear, mastoid cells, and labyrinth. Vertebrae in portions of cervical and dorsal spine carious. Pia-mater congested.

Case 12.—*Gazette des Hôpitaux*, No. 67, 1880. Treated by C. Miot, Paris. Male, age thirty-five. Tubercular. Chronic otorrhœa. Right facial paralysis. Painful mastoid. Death.

Autopsy.—Pus in middle ear and mastoid cells; ossicles gone; caries of tympanic walls; dura-mater red, thickened and softened. Facial nerve and chorda-tympani largely destroyed.

Case 13.—*Journal of Anatomy and Physiology*, Vol. XIV. Treated by P. McBride and Alex. Bruce. Right ear. Chronic otorrhœa. Death.

Autopsy.—Pus in middle ear, mastoid cells, vestibule and cochlea. Abscess in outer half of right cerebral hemisphere, adherent to the posterior surface of the petrous bone, in the vicinity of the internal auditory nerve. Dura-mater detached at this point.

Case 14.—*Archives of Otolaryngology*, July, 1879. Treated by C. J. Kipp. Male, age twenty-three. Right ear;

chronic otorrhœa. Acute exacerbation. Pain over right side of head. No mastoid tenderness. Meatus red; chills; fever; vomiting; headache; both optic nerves congested; convulsions; unconsciousness; bowels regular; coma; death.

Autopsy.—Longitudinal sinus filled with blood. Abscess in temporal lobe; not encapsulated; on removing the lateral sinus, puriform fluid escaped, which was found to come out of a round opening in the anterior and outer wall of the sinus. A large thrombus existed in the sinus. Pus in middle ear and mastoid cells. Drum-head perforated. Malleus and incus carious.

Case 15.—American Otological Society, July 25, 1882. Treated by A. Mathewson, of Brooklyn. Male, eleven years; chronic otorrhœa; mastoiditis; apparently cured; recurrence; convulsions. Death.

Autopsy.—Abscess of cerebellum. Pus between dura-mater and tegmen-tympani.

Case 16.—American Otological Society, July 25, 1882. Treated by C. S. Merrill, of Albany. Male, age 32; acute otitis. Death.

Autopsy.—Pus over the region of the petrous bone, extending from the tympanic cavity through two or three small openings in the tegmen-tympani.

Case 17.—*American Journal of Medical Sciences*, May, 1892. Treated by G. W. Prentiss. Male, age 31. Right ear; chronic otorrhœa; earache and headache; chills; fever; high temperature; pain in the temporal region and over right eye; mastoid unaffected. Death.

Autopsy.—Abscess in anterior lobe of left hemisphere of cerebellum. Marked discoloration of the dura-mater covering the petrous portion of the temporal bone. Caries of petrous bone at this point. Lateral sinus filled with clotted blood. Purulent opening through the walls of lateral sinus communicated with the abscess.

Case 18.—*American Journal of Otolology*, July, 1882. Treated by Mr. Field, of England. Male, age 42. Chronic otorrhœa; left ear. Death.

Autopsy.—Congestion of dura-mater. Puro-lymph in meshes of pia-mater over the left sphenoidal lobe. Abscess in left lobe of the cerebellum. The temporal bone was considerably necrosed with yellowish and greenish discolorations on the walls of the tympanum. Middle ear full of pus. Drum-head gone.

Case 19.—*Philadelphia Medical Times*, August 27, 1891. Treated by G. C. Harlan. Female, age 14. Left ear; chronic otorrhœa; left facial paralysis. Death.

Autopsy.—Meningitis. Abscess of the left lobe of the cerebellum. Almost entire destruction of the anterior wall of the ex. meatus. Drum-head gone. Caries of middle ear.

Case 20.—*Edinburg Medical Journal*, June 1881. Treated by Robert Sinclair. Male, age 22; right ear; Chronic otorrhœa; took cold; unconscious; maniacal; right pupil contracted; mastoid swelling. Wildes' incision. No relief. Death.

Autopsy.—Abscess having a direct communication with the middle ear, in temporo-sphenoidal lobe.

Case 21.—*Australian Medical Journal*, April 15, 1881. Treated by Robertson. Male, age 39; left ear. total deafness; no previous history; purulent discharge from ear; left facial paralysis. Death.

Autopsy.—Caries in middle ear. Abscess in left middle crus-cerebelli, extending partly into the cerebellum itself, and inwards into the pons abutting on the fourth ventricle and pressing on the seventh nerve.

Case 22.—*New York Medical and Surgical Brief*, February, 1879. Treated by W. Oliver Moore. Male, age 50. Right ear; chronic otorrhœa; acute exacerbation; swollen mastoid; abscess opened; vomiting; semi-consciousness and facial paralysis; divergent strabismus. Pupils contracted. Death.

Autopsy.—Caries extending backward and upward from the mastoid portion as far as the parieto-occipital suture. There was an opening through this suture leading into cavity of the skull on a level with the lateral sinus. The sinus was empty and felt like a fibrous cord. A probe passed through it was arrested just where the lateral sinus joins the jugular vein. Meninges very much congested. Pus in the posterior fossa between dura-mater and skull. Caries at this point. Abscess in right lobe of cerebellum.

Case 23.—*Glasgow Medical and Surgical Journal*, January, 1880. Treated by Thomas Barr. Male, age 17; left ear; chronic otorrhœa; pain, especially in left side of forehead; languid and drowsy; vomiting; aphasia; epilepsy.

Autopsy.—The left sphenoidal lobe was found adherent to the bone beneath. Abscess in left sphenoidal lobe. Petrous bone carious in two places. One through roof of the tympanum; the other in the groove for the lateral sinus. The last one communicated with the mastoid cells.

Case 24.—*Journal of Anatomy and Physiology*, April, 1888. Treated by P. McBride and Alexander Bruce. Female; chronic otorrhœa; death.

Autopsy.—Abscess in cerebellum, right lobe.

Case 25.—*Gazette Hospitalier*, No. 39, 1885. Treated by Jaccoud. Right ear; tubercular case; sudden pain and deafness; profuse discharge; vomiting and dizziness; mastoid painful; fever; death.

Autopsy.—Pus at base of middle lobe of cerebrum. Tympanic cavity purulent, granular and carious. Drum-head destroyed.

Case 26.—*Van Langenbeck's Archives*, Vol. 28, page 556. Treated by T. H. Gluck. Right ear; chronic otorrhœa; aural hæmorrhages; headache; fainting; convulsions; amaurosis; soporous condition; facial paralysis; paralysis of right arm.

Operation.—Posterior wall of meatus chiselled

away, also a portion of the mastoid. The dura-mater was exposed, and appeared fluctuating. Pus found between dura and pia-maters. Death.

Autopsy.—Purulent degeneration of the dura mater, especially from the longitudinal sinus to the base of the brain.

Case 27.—*Archives of Otology*, September, 1880.—Treated by J. Michael, of Hamburg. Left ear. Chronic otorrhœa. Years ago received a blow on left side of head; insensibility for a few hours followed; in a few days recovery occurred, with an occasional pain on the left side of the head. He has had a discharge from both ears, and been rather deaf for the last two years.

Nov. 10, 1877. Violent headaches, starting on left side. He has a feeling of pressure, feels stupid and has slight aphasia. He lies in bed with his head drawn somewhat downward into his neck; his face is red; pupils sluggish; constipation; no fever; aural poly-pi in both ears; removed; syringe; calomel and ice bags; no improvement.

Nov. 16. Spasms and unconsciousness. Stiff flexion of all four extremities. Then followed delirium, stupor, sensitive skin; pain upon moving back. Death.

Autopsy.—A yellowish projecting spot existed somewhat above the surface of the dura-mater, over the crista superior of the petrous bone. This corresponded to the site of the injury. The pia-mater at the convexity covered with pus. Abscess in left temporo-sphenoidal lobe. The ventricle was filled with pus. An opening existed outward from the corpus striatum, communicating with the abscess. Temporal lobe largely broken down with purulent degeneration. The frontal lobe œdematous and softened. The right lateral ventricle, as well as the third and fourth, was filled with a purulent fluid. The pia-mater at the base charged with pus. This extended down the ver-

tebral canal. Both mastoid cavities were filled with pus.

Case 28.—*Lancet*, May 28, 1880. Treated by Henry Morris. Male, age 31. Left ear. Chronic otorrhœa, deafness, pain, red mastoid, chills, unconsciousness. Mastoid opened, temporary improvement, then pyæmia, herpes on face. Death.

Autopsy.—Thrombi in left lateral sinus and jugular vein.

Case 29.—*Archives of Otology*, September, 1880. Treated by Eugene Frankel. Female, age 23. Left ear. Chronic otorrhœa, acute exacerbation, meningitis. Death.

Autopsy.—Pus in tympanum; opening through drum-head; thrombo-phlebitis of transverse sinus; abscess in sub-dural space and in left temporal lobe; purulent lepto-meningitis of the base and the convexity.

Case 30.—*Archives of Otology*, September, 1880. Treated by Eugene Frankel. Male, age 22. Right ear. Chronic otorrhœa, appearance of cerebral symptoms after a knock on the head. Death.

Autopsy.—Pus in tympanum, no perforation of drum-head, incus gone. Caries of petrous bone, through roof of tympanum. Abscess in right temporal lobe, encapsulated. Thrombo-phlebitis of right transverse sinus.

Case 31.—*Archives of Otology*, September, 1880. Treated by Eugene Frankel. Female, age 28. Chronic otorrhœa. Right facial paralysis, vomiting, retained urine, dilated pupils, mastoid not opened; coma. Death.

Autopsy.—Pus in tympanum, perforation of drum-head. Caries of roof of tympanum and of ex. aud. meatus. An inspissated exudation compressed the facial nerve in the Fallopiian canal. Purulent basilar meningitis; abscess in right temporal lobe, encapsulated. Mastoid sclerosed.

Case 32.—Archives of Otolology, September, 1880. Treated by Eugene Frankel. Male, age 53. Left ear. Chronic otorrhœa, polypus, removed, headaches, mastoid opened, meningitis. Death.

Autopsy.—Epithelioma of left ear, with destruction of most of the temporal bone. Purulent basilar meningitis.

Case 33.—Archives of Otolology, September, 1880. Treated by Eugene Frankel. Female, age 3. Left ear. Pebble in left ex. meatus, attempt at removal, meningitis. Death.

Autopsy.—Drum-head gone. Pebble in middle ear, pus in middle ear. Purulent meningitis of the convexity.

Case 34.—American Journal of Otolology, No. 3, 1879. Treated by J. Orne Greene. Otitis media, polypus, vomiting, pain, convulsions. Death.

Autopsy.—Carious destruction of vault of tympanum. Perforation of dura-mater near transverse sinus. Abscess of temporal lobe.

Case 35.—Lancet, 1878, vol. I, No. 20. Treated by G. C. Gribbon. Male, age 22. Right ear. Chronic otorrhœa, drum-head destroyed, violent headache, nausea, paresis of lower extremities. Death.

Autopsy.—Abscess in right lobe of cerebellum. Caries of petrous bone at the internal auditory meatus. Pus in mastoid cells.

Case 36.—Archives für Ohrenheilk., vol. xix, No. 4, page 245. Treated by K. Burkner. Male, age 36. Right ear. Chronic otorrhœa, pain in ear and head, deafness, diminution of discharge, convulsions, delirium, coma, cedematous swelling over superior boundary of mastoid muscle, a probe passes through posterior superior wall of external meatus, reaches carious cavity. Death.

Autopsy.—Necrosis in tympanum and external meatus. Dura-mater in region of temporal bone is injected, thickened and covered with pus.

Case 37.—*Archives für Ohrenheilk.*, vol. xix, No. 4. Treated by K. Burkner. Male, age 20. Left ear. Chronic otorrhœa (bilateral), sudden pain in left ear, cessation of discharge, chills, vomiting, vertigo, high fever, a thrombus felt in the left jugular, pain in neck, apathetic condition, left mastoid red and swollen, facial veins enlarged. Death.

Autopsy.—Thrombi in transverse sinus and in bulbous venæ jugularis. Red points and minute holes in the thin jugular fossa.

Case 38.—*Archives für Ohrenheilk.*, vol. xix, No. 4. Treated by K. Burkner. Male, age 17. Left ear. Acute purulent otitis, left facial paralysis, granulations in middle ear, removed, improvement; some weeks later had sudden pain in ear. Discharge stopped, return of bad symptoms, contraction of left pupil, nystagmus of both eyes, somnolence, total deafness of left ear, paresis of left leg, paralysis of left abducens, pain in all branches of the trigeminus, vomiting. Death.

Autopsy.—Pus around chiasm. Anterior extremity of left lobe of cerebellum is adherent to the posterior margin of the temporal bone. Abscess in left pons. At the superior border of the temporal bone, are three small carious openings, communicating with an irregular cavity, involving the entire posterior portion of the temporal bone. This cavity is filled with a greasy, shining, yellowish-white mass, which infiltrates the posterior wall of the temporal bone, just above the sigmoid sulcus, and is also connected with the vestibule. The ossicles are gone. Internal ear destroyed by gelatinous mass.

Case 39.—*American Journal of Otology*, April, 1881. Treated by E. G. Loring, of New York City. Male. Middle age. Right ear. In April, 1878, he consulted Loring with influenza, poor hearing, closure of Eustachian tubes. Recovered. December, 1878, had a similar attack. Recovered. December, 1879, had

frequent similar occurrences. April, 1880, pain in ear and side of head, acute catarrhal otitis. Improvement. A few days later had severe pain again. Delirium, drum-head punctured, no pus. Death.

Autopsy.—Dura-mater intensely congested at the roof of the tympanum. Sero-purulent exudation in sub-arachnoid space. This exudation extends from the longitudinal fissure down upon the side of the brain. Pus in upper surface of right lobe of cerebellum. Pseudo-membrane in tympanum.

Case 40.—*Archives der Heilkunde*, vol. ii, page 295. Treated by H. Wendt. Male, age 49. Right ear. March 13, 1869, consulted Wendt. Tinnitus aurium, pain, deaf. March 30, unconsciousness, convulsions. Death.

Autopsy.—Basilar meningitis.

Case 41.—*Archives der Heilkunde*, vol. ii, page 295. Treated by H. Wendt. Male, age 52. Right ear. Caught cold, acute catarrhal otitis, perforation of drum-head, pain and tinnitus aurium. Found dead in bed.

Autopsy.—Diffuse meningitis.

Case 42.—*Archives der Heilkunde*, Vol. ii, p. 295. Treated by H. Wendt. Traumatic inflammation of middle ear; death.

Autopsy.—Basilar meningitis.

Case 43.—Service of E. de Rossi, of Rome. Female, age 57. Left ear. September, 1880, had malaria, went to the hospital. Three weeks afterwards had tinnitus aurium in the left ear, no pain. Acute otorrhea. February 1881. Left side of neck swelled. March 2. Swelling incised and pus evacuated. March 3. Swelling increasing, painful to pressure, pus comes from meatus on pressure of swelling. Polypus in middle ear; middle ear is also connected by a sinus with the swelling. An attempt to open mastoid was made, but extreme sclerosis prevented. Chills; death.

Autopsy.—Coagulated blood in left sinuses, localized

meningitis, clot in jugular vein, caries of atlas and second vertebra, pus in cavum tympanum, occipital condyles carious, pus in mastoid cells. Carious opening in posterior walls of mastoid antrum, communicating freely with sigmoid sinus. Transverse sinus surrounded by pus.

Case 44.—Service of E. de Rossi, of Rome. Female, age 18. Right ear. Chronic otorrhœa. January 6. Pain in ear and side of head; fever. January 9. Came to the hospital. Deafness; tympanic granulations removed. Improvement. Headache, fever, exophthalmia, ptosis. Violent pain in head, painful swelling over mastoid muscles. Coma, death.

Autopsy.—Dura mater adherent to the bone. Pus in subdural space, corresponding with the inferior side of the frontal and sphenoidal lobe and the anterior margin of the right hemisphere of the cerebellum. Pus covered the trigeminus and acoustic nerves. Dura mater at base of skull covered with pus; superior petrosal sinus, inferior cavernous sinus and transverse sinus filled with pus.

Caries was found in that part of the base of the skull which corresponded with the tegmen-tympani. Pus in tympanic cavity. The pus had burrowed laterally in the subdural space to the entire extent of the right lobes of the cerebrum and cerebellum. Several of the large veins which opened into the longitudinal sinus showed thrombi; thrombus in longitudinal sinus; abscess in the inferior posterior side of the frontal lobe.

Case 45.—King's College Hospital Reports. Treated by Urban Pritchard, of London. Male, age 23. Left ear. Chronic otorrhœa. Frontal headache, pain in left ear. April 1889. Caught cold; increased discharge and pain; several attacks of unconsciousness, with loss of speech. June 17. Convulsions; twitching of left side of face; semiconsciousness; fits. June 23, 1889. Came to hospital. Drowsy, incoherent. Ten-

derness on pressure, most marked about two inches above meatus. Slight facial paralysis. Operation June 23, 1889. Skull trephined at a spot about 2 inches above, and $\frac{1}{2}$ inch in front of the meatus; no pus. Trephined again 1 inch behind the original opening. Pus found outside of dura mater. Trephined again over occipito-parietal region; no pus. The dura mater was at all times left intact. The whole wound was thoroughly irrigated and dressed antiseptically. Recovery. Occasionally has short attacks of aphasia.

Case 46.—King's College Hospital Reports. Treated by Urban Pritchard, of London. Male, age 26. Left ear. Chronic otorrhœa. Pain in the ear, and swelling of left side of neck. September 7, 1889. Intense pain in ear and side of head; chills; vomiting. September 11. Came to hospital. Intense pain in head, focussing in left temporal fossa; dizzy; polypos in middle ear. September 14. Temperature 101° . Delirium, vomiting, twitching of left eyebrow and angle of mouth. September 16. Retention of urine; semi-conscious. Operation. Trephined $1\frac{1}{2}$ inch behind the meatus, and the same distance above the cerebral base line; pus evacuated, brain débris removed. Wound irrigated, drainage tube, antiseptic dressings. Improvement, delirium, chills. September 24. Wound re-explored, no pus; mastoid opened, no pus. September 26. Paralysis of right arm and leg. September 30. Optic neuritis, left eye. October 2, the track of the drainage tube was freely dilated; pus escaped. Slow recovery; still has chronic otorrhœa; has had two attacks of unconsciousness since discharge, and once some aphasia.

Case 47.—*Archives of Otology*, March 1882. Treated by G. S. Munson, of Albany, N. Y. Female, age 39. Left ear, chronic otorrhœa, has had partial left facial paralysis. Pain in left ear, vomiting, tinnitus aurium, no mastoid symptoms. Convulsions, right-sided

headache, deafness, eustachian tubes closed, polypus in tympanum: its removal refused. November 15. Greater pain, delirium, unconsciousness, high temperature and pulse, coma. Convergent strabismus left eye, iris unresponsive. Death.

Autopsy.—Polypus of ex. meatus, semicircular canals carious. Abscess of middle lobe of cerebrum, directly above the semicircular canals, and an opening in the meninges and brain tissue connected the semicircular canals and the abscess.

Case 48.—*Lancet*, August 13, 1887. Treated by J. P. Gray. Age 26. Chronic otorrhœa, pain in and behind ear, facial paralysis, fever. Apathetic, half-comatose, paralysis and anæsthesia of left leg, delirium. Mastoid opened; no pus. Coma, hemiplegia, hemianæsthesia, death.

Autopsy.—Right cerebral hemisphere covered with pus. Perforation of dura mater upon posterior surface of petrous bone, carious opening through roof of tympanum, abscess between dura mater and petrous bone.

Case 49.—Transactions American Otological Society. Treated by O. D. Pomeroy. Otorrhœa; death.

Autopsy.—Abscess (diffused) of anterior and upper third of right lobe of cerebellum, carious condition of tympanum, carious opening through roof of tympanum.

Case 50.—*Archives of Otology*, June, 1889. Treated by James Finlayson and Thomas Barr. Male, age 22. Right ear, chronic otorrhœa, acute exacerbation, fever moderate, giddy, pain in jaw and behind ear, vomiting, chills, pain in frontal and occipital regions, pain in back, head retracted, right facial paralysis, constipation, stupor, vomiting, death.

Autopsy.—Congestion of pia mater, purulent exudation in frontal convolution of both sides, purulent fluid at base, in the region of the medulla. Brain adherent near right internal auditory meatus: the

extreme anterior end of right cerebellum necrosed. Purulent inflammation at base of brain, granulations in tympanum and mastoid antrum, malleus and incus gone. The facial nerve was much disorganized and denuded of its bony covering by caries.

The mastoid cells, with the exception of the antrum, were obliterated and converted into a sclerosed mass. Pus in the antrum, caries of tympanum, auditory nerve disorganized, cribriform lamina destroyed by caries. On the upper part of the petrous bone a caries aperture communicated with the cochlea. Bone over the superior semicircular canals was carious.

Case 51.—*British Medical Journal*, Dec. 11, 1886. Treated by B. Gowers and E. Barker. Age nineteen. Right ear. Chronic otorrhœa; pain in and around ear; fever; bilateral optic neuritis; vomiting; unequal pupils; mastoid opened; improvement, but still unequal pupils, and optic neuritis persisted; again vomiting; stupor, insomnia, delirium, fever and chills.

Operation.—Skull trephined one and one-fourth inches behind and one and one-fourth inches above the centre of the meatus, or, in other words, at the lower posterior angle of the parietal bone, near the squamous suture.

Antiseptic precautions were taken. An aspirator needle was introduced into the temporal lobe, inward, forward and downward, and pus evacuated. The opening was enlarged. The brain debris was removed. A drainage tube was employed.

The after-treatment consisted of irrigations with boracic acid solution. Recovery.

Case 52.—*Archives of Otology*, Vol. 12, No. 1. Treated by H. Knapp. Male, age thirty-nine. Right ear. Acute purulent otitis; pain in ear and head, especially in the right occipital region; later, pain, swelling and fluctuations in left occipital region; incision

at this point; pus liberated; bone denuded; wound kept open; improvement. After a time patient became worse. It was ascertained that the pus in the occipital region came from the interior of the skull. Frontal headaches; insomnia; nausea; pale; chills; fever; swelling below original opening; incised; pus found; drained; some improvement; patient became worse again; optic neuritis both eyes; another swelling appeared, upward and backward from original opening; incised; pus found; drained; probe passed into cranial cavity; pain in right side of forehead; nausea; vomiting; delirium; coma. Death.

Autopsy.—The openings in the skull referred to in the history of the case were found. At the outer surface of the lateral sinus a thick streak of pus led along the transverse sulcus to a large collection of pus at the lowest part of the sigmoid fossa. Pus in mastoid cells and tympanum. Abscess in middle and outer part of the little brain. Not encapsulated.

Case 53.—*Archives of Otology*, March, 1880. Treated by H. Steinbrugge. Male, age fifty-eight. Right ear. Chronic otorrhea; vertigo; pain in right parietal region and ear; neuralgia in third branch of right trigeminus; cholesteatomatous masses in meatus and middle ear; left arm and leg partially paralyzed; impaired vision; constipation; coma. Death.

Autopsy.—Fluid blood in all sinuses. Pia-mater congested. Right temporal lobe adherent to petrous bone. Abscess in right temporal lobe. Encapsulated. Surrounding brain substance sclerosed. Left optic nerve atrophied. Perforation through right petrous bone (anterior surface) and dura-mater. Carious opening in semi-circular canals. Drum-head and ossicles gone. Tympanum badly necrosed, so that it and the mastoid antrum are thrown into one cavity, all filled with cholesteatoma.

Case 54.—*Breslauer Aerztl. Zeitschr.*, No. 9, 1879.

Treated by Otto Binswanger. Male, age fifty-one. Right ear. Neither discharge from his ears nor deafness has been observed; fever; loss of appetite; vomiting; paralysis of left arm; epilepsy; chronic convulsions; right pupil dilated.

Autopsy.—Abscess in right first frontal convolution. Encapsulated. Roof of right tympanum inflamed. Granulations in right tympanum and mastoid cells. Drum-head destroyed. Ossicles intact.

Case 55.—*Archives für Ohrenheil*, 1879, No's 11 and 12. Treated by E. F. Kretschy. He publishes three cases of fatal purulent inflammation of the middle ear; histories not given.

Autopsy.—Thrombus purulent in left transverse sinus. Pus in jugular sinus, and a defect in its anterior wall, led to the necrosed petrous bone. Cholesteatoma in the tympanum. Fibrous tissue about jugular vein infiltrated with serum and pus.

Case 56.—*Archives für Ohrenheil*, 1879, No's 11 and 12. Treated by E. F. Kretschy.

Autopsy.—Purulent infiltration of inner membranes of brain.

Case 57.—*Archives für Ohrenheil*, 1879, No's 11 and 12. Treated by E. F. Kretschy.

Autopsy.—Abscess in left cerebellum.

Case 58.—Treated by Burekhardt. Female, age nineteen. Left ear. Chronic otorrhea. Died of meningitic symptoms after an illness of sixteen days.

Autopsy.—Left trigeminus acousticus and facialis imbedded in pus. Purulent pia-mater. Thrombus in superior sinus. Caries of petrosal sinus canal. Polypus in tympanum. Mastoid cells absent.

Case 59.—Treated by Burekhardt. Age two and three-fourths. Death from tubercular meningitis.

Autopsy.—Partial necrosis of left wall of lateral sinus. Thrombus in lateral sinus. Carious openings of bony walls of sulcus transversus.

Case 60.—Treated by Burekhardt. Female, age seven and one-half.

Autopsy.—Ossicles gone. Caries of mastoid process. Caries of lower wall of parietal bone.

Case 61.—Treated by Burekhardt. Female, age two and three-fourths.

Autopsy.—Multiple caries on skull. Left drum-head gone. Malleus and incus gone. Necrosis of mastoid process.

Case 62.—*Archives of Otolaryngology*, December, 1879. Treated by Arthur Hartman. Female, age thirty-four. Left ear. Chronic otorrhœa; occasional acute exacerbations; painful mastoid; fever and chills; pain in left temple; delirium. Death.

Autopsy.—Anterior left hemisphere covered with pus, which extended to the base of the brain. Dura-mater over left tegmen-tympani was discolored and pierced by a few openings, beneath which a cavity full of pus was seen. The pus being removed, the tegmen was found to be perforated by a few small orifices which led into the tympanum. An abscess in the brain was discovered, corresponding in situation with that over the tegmen, and extending into the lateral ventricle, which, with the right and middle ventricle, was filled with pus. The spinal cord was surrounded by pus. Polypus in tympanum and some necrosis in that space. Both tegmen and antrum were perforated by small openings which led into the middle cranial fossa. Sclerosis of mastoid.

Case 63.—*Archives of Otolaryngology*, December, 1879. Treated by Arthur Hartman. Male, age thirty. Left ear. Chronic otorrhœa; violent pain in left half of face, which led to facial paralysis; later, the pain involved the entire head; polypus in left middle ear; temporal bone not especially painful. Death.

Autopsy.—Purulent meningitis of posterior cerebral fossa, and an abscess in left cerebellum. The

bony wall of facial canal carious. Caries of semi-circular canal. Sclerosis of mastoid.

Case 64.—*Archives of Otolaryngology*, December, 1879. Treated by Arthur Hartman. Male, age thirteen. Right ear. Chronic otorrhœa; meningitis; swollen mastoid; Wilde's incision; pus liberated; delirium; coma. Death.

Autopsy.—Pus patches over brain surface. Pus at base of brain, especially at right cerebellum. Abscess in middle cranial fossa. Pus at sella turcica and left middle cranial fossa. Necrosis of tegmen-tympani. Tympanum carious. Mastoid sclerosed.

Case 65.—*Lancet*, June, 1880. Mr. Field. Male, age eighteen. Right ear. Chronic otorrhœa; pain in head. Death.

Autopsy.—Suppurative meningitis over right petrous bone. Inner mastoid surface at lateral sinus carious. Thrombus in lateral sinus. Abscess of right temporo-sphenoidal lobe and occipital lobe. Abscess in right cerebellum. Incus and stapes gone.

Case 66.—*Archives of Otolaryngology*, March, 1880. Treated by T. R. Pooley. Male, age forty-five. Left ear. Blow on left side of head, followed by deafness and otorrhœa; painful ear; tinnitus aurium; drum-head perforated; mastoid swollen, red and painful; mastoid opened; pus found; not much fever. Death.

Autopsy.—Abscess in left middle lobe. Left-sided pachymeningitis. Petrous bone carious, especially outer half of middle surface. Pus in lateral ventricle of right side of brain.

Case 67.—*American Journal of Otolaryngology*, January, 1881, page 26. Treated by C. S. Rodman, of Waterbury, Conn. Male, age twenty-one. Right ear. Chronic otorrhœa; occasional acute exacerbations; mastoid symptoms; mastoid opened; pus found. Death.

Autopsy.—Meningitis. Pus in neck between mastoid and styloid process. Mastoid carious. Caries in the inner plate of mastoid, at sulcus of lateral

sinus. Caries of squamous. The lower surface of mastoid had three carious perforations in the groove next the tip of the mastoid in the digastric fossa, all communicating with the carious mastoid cells. Caries of mastoid antrum.

Case 68.—*Deutsche Medical Wochens.*, 1890, No. 48. Treated by E. Hoffman. He discovered in the course of an operation for mastoid abscess, an abscess in the occipital lobe, which he opened. Recovery.

Case 69.—*Dublin Medical Journal*, July, 1890. Treated by R. G. Patterson. Pyæmia, following a suppurating ear.

Autopsy.—Thrombus in the lateral sinus.

Case 70.—*Archives für Ohrenheil*, March 18, 1879. Treated by Burckhardt-Merian. Female, age nineteen. Left ear. Chronic otorrhœa; meningitis. Death.

Autopsy.—Left circumscribed basilar meningitis. Fistula between mastoid antrum and superior petrosal sinus. Polypus in tympanum. No mastoid cells.

Case 71.—*Archives für Ohrenheil*, March 18, 1879. Treated by Burckhardt-Merian. Left ear. Chronic otorrhœa.

Autopsy.—Caries of tympanum, antrum, mastoid cells and osseous wall of lateral sinus. Thrombosis of lateral sinus. Tubercular meningitis.

Case 72.—*Archives für Ohrenheil*, March 18, 1879. Treated by Burckhardt-Merian.

Autopsy.—Caries of tympanum and antrum. Carious opening through outer wall of mastoid. Caries of parietal bone. Meningitis.

Case 73.—*Archives für Ohrenheil*, March 18, 1879. Treated by Burckhardt-Merian. Chronic otorrhœa.

Autopsy.—Necrosis of antrum and squamous. Meningitis.

Case 74.—*Medical Times and Gazette*, May 8, 1880. Treated by Johnson. Male, age fourteen. Right ear.

Chronic otorrhea; chills; headache; thoracic pains; unsteady gait; constipation; night sweats; pupils dilated; delirium; temperature and pulse not high; coma. Death.

Autopsy.—Double pleurisy. Pus in lungs. Pus in right internal jugular vein. Abscess at apex of petrous bone. Necrosis of petrous bone near labyrinth. Blood coagulum in sigmoid sinus. Pus in tympanum.

Case 75.—*Medical Times and Gazette*, May 8, 1880. Treated by Henry Thompson. Female, age twelve. Right ear. Tuberculous; chronic otorrhea; headache; vertigo; vomiting; dilated pupils; temperature and pulse not high; chills; involuntary defecation; cough; thoracic pains; coma; convulsions. Death.

Autopsy.—Congestion of pia-mater. Right cerebellum adherent to dura-mater. Abscess in right cerebellum. Tubercular deposits in brain. Pus in right half of posterior occipital fossa. Pus in right sigmoid sinus. Thrombus in right internal jugular vein, sub-clavian vein, vena-cava and right auricle. Lungs abscessed. Tympanic cavity, vestibule, and semi-circular canal filled with pus.

Case 76.—*Archives of Otolology*, December, 1888. Treated by Henry Ferrer, of San Francisco, California. Male, age sixty. Mastoid abscess; opened mastoid. Death from hematemeses.

Autopsy.—Pus and granulations in mastoid cells and tympanum. Meningitis.

Case 77.—*Archives of Otolology*, December, 1888. Treated by Lewis, of Birmingham, England. Mastoid abscess. Death.

Autopsy.—Abscess in temporo-sphenoidal lobe.

Case 78.—*Archives of Otolology*, December, 1888. Treated by Lewis, of Birmingham, England. Mastoid abscess. Death.

Autopsy.—Phlebitis of lateral sinus.

Case 79.—*Archives of Otolaryngology*, December, 1888. Treated by Thomas Barr, of Glasgow. Male, age twenty-one; left ear; chronic otorrhœa; headache; slow and intermittent pulse; normal or sub-normal temperature; contraction of left pupil; paresis of all ocular muscles excepting external rectus; partial right facial paralysis; paresis of right arm, with wrist-drop; mastoid opened; no pus found; skull trephined above the external meatus; brain tissue pierced with trocar; pus found; cavity irrigated; chicken-bone drainage tube; antiseptic dressing; dressing not removed for three weeks; the opening filled in with bone. **Recovery.**

Case 80.—*Archives of Otolaryngology*, December, 1888. Treated by Roosa, of New York City. Female, age forty-two. Left ear. Advanced Bright's disease; acute otitis; drum-head lanced; pain and tenderness at junction of temporal and occipital bones; temperature moderately high. **Death.**

Autopsy.—Caries of tympanum. Pus in middle ear. Seventh nerve exposed and imbedded in pus. No mastoid disease. **Meningitis.**

Case 81.—*British Medical Journal*, April 14, 1888. Treated by Arthur E. Braker. Male, age thirty. Right ear. Chronic otorrhœa; lateral sclerosis of spinal cord; acute exacerbation; pain in right half of head; vomiting; epilepsy; contraction of right pupil; mastoid opened; no pus; rapid emaciation; incontinence of urine; stupor; somnolence.

Diagnosis.—Abscess in temporo-sphenoidal lobe.

Operation.—Parietal bone trephined; dura-mater incised; no pus; trephined again one and one-half inches above and one and one-quarter inches behind the external meatus; a needle was passed one and one-half inches deep, forward and inward; pus found; rubber drainage tube; iodoform dressing. **Recovery.**

Case 82.—*New York Medical Journal*, February 25,

1887. Treated by Abbe. Acute otitis media; acute meningitis; choked disc on same side. Death.

Autopsy.—Purulent meningitis at base of cerebrum and lower surface of cerebellum. No evidence that pus had extended from the ear. The internal auditory canal showed streaks of pus, following the course of the nerve.

Case 83.—*Archives für Ohrenheil*, vol. 26, page 84. Treated by Schmiegelow, of Copenhagen. Male. Right ear. Chronic non-suppurative; inflammation of the middle ear; suddenly seized with neuralgia of all three branches of right trigeminus, followed by right facial paralysis; right choked disc; later, purulent otitis; pain; mastoid inflammation; mastoid opened; pus and granulations found; edema of right side of face; skull trephined at posterior cranial fossa; no pus; mastoid opening enlarged backward; improvement; later, nausea; fever; headache; vomiting; unconsciousness. Death.

Autopsy.—Diffuse purulent lepto-meningitis. Abscess in temporal lobe of cerebrum.

Case 84.—*New York Medical Journal*, June 12, 1886. Treated by A. Mathewson. Male, age forty. Right ear. Chronic otorrhœa; pain over mastoid; Wilde's incision; brain complication. Death.

Autopsy.—Caries of tympanic roof. Abscess of brain over tympanum.

Case 85.—*New York Medical Journal*, June 12, 1886. Treated by A. Mathewson. Female, age eleven. Left ear. Chronic otorrhœa; middle ear, polypus; spontaneous opening in external mastoid plate; facial paralysis; improvement; later became worse; pain; vomiting; drowsiness; constipation; optic neuritis; convulsions. Death.

Autopsy.—Dura-mater adherent to petrous bone. Pus in cerebellum.

Case 86.—*New York Medical Journal*, June 12, 1886. Treated by A. Mathewson. Male, age five and one-

half. Right ear. Acute otitis media; drum-head not perforated. Death.

Autopsy.—Caries of roof of tympanum. Basilar meningitis.

Case 87.—*British Medical Journal*, 1887, No. 1363, page 317. Treated by W. S. Greenfield. Male, age twenty-six. Left ear, Deafness; headache; vomiting; ptosis of lid; optic neuritis; sub normal temperature. Semi-comatose.

Diagnosis.—Abscess of temporo-sphenoidal lobe.

Operation.—Skull trephined; dura-mater incised; pus found; irrigation; drainage. Recovery.

Case 88.—*Canada Lancet*, November, 1881. Treated by G. S. Ryerson. Child. Left ear. Scarlet fever; acute purulent otitis; mastoid pain; swelling and tenderness; pain in head; ptosis of right eyelid; divergent squint of right eye; both pupils dilated. Coma; mastoid opened; pus found; improvement; later, became worse; vision poor; optic discs swollen; fever; delirium. Death.

Autopsy.—Dura-mater adherent to skull. Pus on surface of both superior lobes. Purulent thrombi in lateral sinus.

Case 89.—*Archives für Ohrenheil*, Vol. 26, page 1. Treated by Wagenhauser. Acute otitis media. Left ear. Mastoid operation. Death.

Autopsy.—Purulent meningitis. Inner plate of mastoid carious, and perforated. Inner surface of petrous bone covered with extensive granulations.

Case 90.—*Archives of Otolgy*, January, 1891, page 1. Treated by Harry Friedenwald, of Baltimore. Male age seventeen. Left ear. Chronic otorrhœa; had an abscess lanced behind his ear years ago; pain and dizziness; aural polypi; left-sided deafness; chills; headache; some fever; tenderness behind ear. Later, chills and high fever.

Operation.—Von Bergmann's landmarks were followed, viz.: from a point 4 cm. behind the external

meatus, in a line made with the lower margin of the orbit, ascend perpendicularly for 5 cm. to reach the point for trephining. No pus. The mastoid was then opened and pus and cholesteatoma were found. Death.

Autopsy.—Pus in the pia-mater covering the surface of the left frontal and parietal lobes. Perforation of inner mastoid plate. Purulent thrombus in lateral sinus.

Case 91.—*Archives of Otolgy*, 1879. Treated by T. M. Pierce. Female, age thirty-four. Left ear. Chronic otorrhœa; hard swelling in front of ear; granulations in meatus, concealing necrosis; pain in left cheek and parietal bone; left facial paralysis; pain in vertex and occipital region; carious bone discharged from ear; meatus very carious; later, the entire area of disease had fallen in, comprising the external meatus, up to the level of the drum-head, exposing the temporo-maxillary articulation; later, condyle of the ramus of the jaw now exposed; later, the area of disease was now almost large enough to admit the closed fist; hernia cerebri appeared; later, paralysis of right side with aphasia; constipation. Death.

Autopsy.—It is not necessary to detail the destruction of bony and other tissues. It was terrific. Even the aqueductus Fallopii, the semi-circular canal, and the carotid canal were exposed. The temporal bone presented a circular aperture through which the tip of the temporo-sphenoidal lobe protruded.

Case 92.—*Transactions American Otological Society*.—Treated by S. Sexton of New York City. Purulent otitis media; caries of the attic, antrum, and tympanum; lymphadenoma; facial paralysis. Death.

Autopsy.—Inner wall of attic gone, leaving the semi-circular canals exposed. Caries of antrum and mastoid cells. Purulent meningitis.

Case 93.—*American Otological Society*, July 30, 1887. Treated by Roosa, of New York City. Male, age eleven. Right ear. Painful swelling over ear; abscess opened; no fistula. Death.

Autopsy.—Abscess in temporo-sphenoidal lobe. Encapsulated. Drum-head perforated. Upper meatus necrotic. At junction of mastoid and squamous, necrosis was present. Meatus and mastoid cells filled with caseous pus.

Case 94.—*Medical Times*, 1885, Vol. 2, page 395. Treated by Parker. Male, age six. Chronic otorrhœa. Abscess above ear; opened; coma; convulsions. Death.

Autopsy.—Necrosis of the floor of the middle temporal fossa, corresponding to position of middle ear. Adhesion between brain and dura-mater. Perforation of dura-mater. Abscess in temporal lobe. Mastoid cells filled with cheesy debris.

Case 95.—*Archives of Otology*, March, 1884. Treated by T. G. Sutphen. Male, age forty-four. Both ears. Chronic otorrhœa; acute exacerbation; pupils contracted; aphasia; seventh nerve on left side paralyzed; choked discs both eyes; necrosis left external meatus; paralysis right arm and leg; an opening was made into the cranial cavity by way of the meatus and mastoid, but no pus was found. Death.

Autopsy.—Abscess in anterior and middle lobes of left hemisphere. Encapsulated. Necrosis of petrous.

Case 96.—*Archives of Otology*, March, 1884. Treated by T. G. Sutphen. Male, age twenty-one. Right ear. Chronic otorrhœa; acute exacerbation; paralysis of right abducens muscle; sight impaired in both eyes; swollen discs both eyes; fever and chills; coma; probe can be passed into cranial cavity by way of upper portion of meatus; no pus. Death.

Autopsy.—Thrombi in right lateral and superior longitudinal sinuses. Caries in the sulcus for the lateral sinus. Necrosis of superior surface of the

petrous. Caries of meatus, tympanum, and walls of mastoid.

Case 97.—*Archives of Otolaryngology*, June, 1881, page 121. Treated by S. Moss, of Heidelberg. Male, age twenty-three. Left ear. Chronic otorrhœa; polypus; paralysis of left facial nerve; total deafness left ear; vertigo; coma. Death.

Autopsy.—Abscess in left cerebellum. Encapsulated.

Case 98.—*Archives of Otolaryngology*, March, 1894. Treated by A. Hedinger. Male. Left ear. Acute purulent otitis; fever; fluctuating; swelling of left parotid gland; opened; found pus. If swelling is pressed, pus may escape from external meatus; coma. Death.

Autopsy.—Much pus under dura-mater and arachnoid. Purulent thrombus in superior petrosal sinus. Ulcer in this sinus communicating with the pyramid. Carious opening connects cranial cavity, tympanum and mastoid antrum. Ulcer in transverso sinus. Pus in antrum and tympanum. External meatus carious.

Case 99.—*Archives of Otolaryngology*, March, 1894. Treated by A. Hedinger. Female, left ear. Acute purulent otitis; fever; polypus; removed; granulations; swelling of glands below ear and frequent attacks of pain in the entire left half of head; vertigo. Death from tuberculosis.

Autopsy.—Ex. meatus carious. Tegmen-tympani carious. Between bulbus venæ jugularis and bony portions of Eustachian tube, there were two fistulæ leading into the pyramid. Tympanum carious and purulent. Internal wall of carotid canal is carious. Thrombus in carotid artery. Mastoid antrum filled with cheesy pus.

Case 100.—*Archives of Otolaryngology*, June, 1885. Treated by Herman Rothholz. Male, age twenty. Right ear. Chronic otorrhœa; pain in vertex; deaf; drum-head gone; polypus; partial paralysis of auditory

nerve: temperature and pulse fairly normal; constipation; stupor; delirium; unconsciousness; divergent strabismus; herpes on right cheek. Death.

Autopsy.—Dura-mater congested. Purulent leptomeningitis, especially at base. Communicating abscess in right cerebellum. Encapsulated. Drum-head gone. Pus and polypus in tympanum. Ossicles gone. Chorda-tympani destroyed. Fallopian canal full of pus. Facial nerve lies exposed in tympanum. It looks normal as it passes through the tympanum, whilst from the gangliform swelling to the internal auditory meatus, it is inflamed. The acoustic nerve presents the same general appearance. Pus in vestibule and cochlea. The petrous bone is saturated with pus.

Case 101.—*Archives of Otolaryngology*, December, 1886. Treated by T. G. Sutphen, Newark, N. J. Male, age twenty-five. Right ear. Chronic otorrhœa, resulting from a blow on the ear. Four years before coming to Sutphen, had an abscess behind the ear, which was opened, and healed; swelling recently recurred with pain; meatus swelled; tympanum filled with granulations and has carious bone; abscess opened, and communication with tympanum established; improvement; later, the conditions became re-established in a more aggravated form; a fistulous opening existed just below the external meatus, through which pus escaped; carious bone in this fistula; water injected into the meatus escaped into the mouth and fistula; later, vomiting; headache; aural hæmorrhages; fever; pain; delirium. Death.

Autopsy.—The bone in the region of the middle ear had been changed into one large carious cavity. Opening into internal carotid artery. Cerebellum abscess communicating with carious cavity.

Case 102.—*Archives of Otolaryngology*, March, 1880. Treated by Thomas R. Pooley. Male, age thirty. Right ear. Chronic otorrhœa: pain in right ear and right

side of head; swollen and tender mastoid; deaf; Wilde's incision; carious bone was found; trephining refused; chills; delirium; mastoid opened: pus found: coma. Death.

Autopsy.—Meningitis at convexity and base. Red inflammatory softening at apex of temporal lobe. Pus in pia-mater and arachnoid. Upper surface of cerebellum inflamed. Pus in tympanum, mastoid antrum and cells, vestibule, semi-circular canals, Eustachian tube, and canal for tensor-tympani. Necrosis in tympanum. Incus and stapes gone.

Case 103.—*Archives of Otology*, June, 1887. Treated by Barr and McEwen of Glasgow. Male, age nine. Right ear. Chronic otorrhœa; acute exacerbation; mastoid abscess; opened; found pus; no improvement; fever slight; ptosis of right eye; paresis left internal rectus and left orbicularis-palpebrarum; veins right side of head congested; right mastoid muscle rigid; pain on pressure of position of vein which passes through the posterior condyloid foramen; dense stupor; pulse slow and feeble. Constipation.

Operation.—General anæsthesia; thorough antiseptics; skull trephined one and one-half inches above and one-half inch behind the centre of the external meatus; dura-mater opened; dura-mater and pia-mater congested; a hollow needle was inserted toward the eminence of the petrous bone; pus found, three-fourths inch deep; the skull was at the same operation again trephined in the base, just above the osseous boundary of the external meatus, involving the squamo-petrous suture; the abscess was reached; irrigation; chicken-bone drainage tube; antiseptic dressings. Recovery.

Case 104.—*Archives of Otology*, September, 1889. Treated by William McEwen of Glasgow. Male, age seventeen. Left ear. Chronic otorrhœa; unconscious; weak and slow pulse; optic neuritis; nearly

moribund; carious sinus into mastoid cells; vomiting; pain in head; chills. Left hemiplegia.

Operation.—Mastoid opened; carious matter expelled; lateral sinus exposed, on which he found granulations; the bone was then perforated further back than the groove for the lateral sinus; pus escaped from over the cerebellum; chicken-bone drainage tube; antiseptic dressings. Recovery.

Case 105.—*British Medical Journal*, November 8, 1879. Treated by Thomas Barr of Glasgow. Male, age seventeen. Left ear. Chronic otorrhœa; vomiting; pain in head; stupor; tremors; convulsions. Death.

Autopsy.—Left temporo-sphenoidal lobe adherent to the bone beneath. Abscess in temporo-sphenoidal lobe. Encapsulated. Two carious openings in petrous bone. One in the tympanic roof; the other in the groove for the lateral sinus, communicating with the mastoid cells.

Case 106.—*Glasgow Medical Journal*, July, 1880. Treated by Thomas Barr of Glasgow. Male, age fourteen. Left ear. Chronic otorrhœa; vomiting; pain; coma; spasmodic contraction of flexors of arms and legs. Death.

Autopsy.—Abscess in temporal lobe. Drum-head gone. Polypus in tympanum. Stapes gone.

Case 107.—*Glasgow Medical Journal*, July, 1880. Treated by Thomas Barr. Male, age seventeen. Left ear. Chronic otorrhœa; aphasia; constipation; unconsciousness; paresis of right side; coma. Death.

Autopsy.—Abscess in left temporal lobe. Carious fistula in roof of antrum. Carious opening in sigmoid flexure. Carious opening in posterior upper wall of ex. meatus. All the fistulæ communicated with the mastoid cells.

Case 108.—*Glasgow Medical Journal*, July, 1880. Treated by Thomas Barr. Male, age twelve. Left

ear. Chronic otorrhœa; pain in mastoid and occiput; chills; vomiting; constipation. Death.

Autopsy.—Pus beneath dura-mater on posterior surface of left petrous bone. The walls of the left lateral sinus were thickened and detached from the bone by underlying pus. Mastoid cells filled with cheesy pus.

Case 109.—Treated by Rimmel. Right ear. Chronic otorrhœa. Medium temperature and pulse; pain in head and neck. Oedema and tenderness over mastoid; later, right facial paralysis; oedema of right upper eye-lid; delirium; anæsthesia right half of face; diarrhœa. Death.

Autopsy.—Caries of tympanum. Thrombus in right lateral sinus. Phlebitis of jugular vein. The thrombus in the lateral sinus extended through the inferior petrosal sinus to the right cavernous sinus, thence through the circular sinus to the left cavernous sinus, which was filled with disorganized clots and pus.

Case 110.—Treated by Taylor. Chronic otorrhœa; delirium; strabismus; diplopia; sudden rise and fall of temperature; retinal veins large and tortuous. Death.

Autopsy.—Thrombosis of lateral sinus. Thrombosis and phlebitis of jugular vein. Abscess in lungs.

Case 111.—Treated by Moss of Heidelberg. Right ear. Acute otitis; pain in right forehead and temple, chills; constipation; somnolence; impaired vision; delirium; sudden rise and fall of temperature. Death.

Autopsy.—Thrombosis right lateral sinus and internal jugular vein. Phlebitis of emissary mastoid vein.

Case 112.—Treated by Moss of Heidelberg. Right ear. Chronic otorrhœa; intense pain in right side of head. Death.

Autopsy.—Thrombosis of sigmoid flexure. Thrombosis of right lateral sinus. Lepto-meningitis.

Case 113.—Treated by Moss of Heidelberg. Right ear. Chronic otorrhœa; chills; pain in occiput; vomiting. Death.

Autopsy.—Phlebitis and thrombosis of lateral sinus. Meningitis. Cholesteatoma in mastoid cells.

Case 114.—Treated by Moss of Heidelberg. Chronic otorrhœa; pain in ear, forehead and occiput; fever; œdema of temple; headache; stupor; spasms of upper extremities. Death.

Autopsy.—Phlebitis and thrombosis of lateral and superior petrosal sinuses. Circumscribed basilar meningitis.

Case 115.—Treated by Burckhardt-Merian. Age, one. Left ear. Chronic otorrhœa; external opening made over mastoid; vomiting; delirium; nose-bleed. Death.

Autopsy.—Tubercular meningitis. Thrombosis of left lateral sinus.

Case 116.—Transactions American Otological Society, 1885. Treated by C. J. Kipp. Female, age twenty-one. Left ear. Furuncle left meatus; pain in head. Death.

Autopsy.—Inflammation of arachnoid and pia-mater. Abscess anterior portion of cerebellum. Left auditory and facial nerves imbedded in pus. Pus in mastoid cells. Slight tympanic inflammation.

Case 117.—*Medical Correspond-Blatt von Württemberg*, 1889. Treated by Kœbel of Stuttgart. Chronic otorrhœa; pain; facial paralysis; mastoid opened; caries of cells, antrum and tympanum; pyæmia. Death.

Autopsy.—Carious openings into middle cerebral fossa and into transverse sinus. Phlebitis and thrombus of transverse sinus.

Case 118.—*Medical Record*, July 7, 1887. Treated

by Roosa of New York City. Male, age forty-one. Right ear. Acute purulent otorrhœa; meningitic symptoms; chills; temperature medium; pulse low; improvement; Wildes' incision; delirium; pyæmia. Death.

Autopsy.—Sinuses filled with dark coagula. In the pia-mater was extensive fibrino-purulent exudation. Lateral ventricles dilated and filled with blood-stained serum. Necrosis of petrous, through roof of tympanum. Lateral sinus, carious.

Case 119.—Transactions American Otological Society. Treated by J. Orne Green. Male, age twenty-five. Chronic otorrhœa; deaf; dizziness; headache; diplopia; partial paralysis; coma. Death.

Autopsy.—Abscess temporo-sphenoidal lobe. Necrosis tegmen-tympani, and sinus connecting auditory canal and cerebral cavity.

Case 120.—Treatise on the Ear, by Roosa, page 532. Treated at New York Hospital. Left ear. Chronic otorrhœa; has had mastoid abscess when young; pain; high fever. Death.

Autopsy.—Pus under dura-mater and in mastoid cells. The entire temporal bone infiltrated with pus. Drum-head gone. Malleus, incus and part of the stapes gone.

Case 121.—Treatise on the Ear, by Roosa, page 532. Treated at New York Eye and Ear Infirmary. Right ear. Acute inflammation of middle ear and meatus; discharge; pain in right side of head; delirium; retention of urine; temperature and pulse medium. Death.

Autopsy.—Right optic nerve atrophied. The meninges at base of cerebellum, and upper part of spinal cord, were covered with lymph and sero-pus. Mastoid bone infiltrated with pus. Drum-head gone. Malleus and incus gone.

Case 122.—Treatise on the Ear, by Roosa. Treated by Cooper, of New Jersey. Male, age sixty-five.

Right ear. Acute purulent otorrhœa; pain behind ear and in head; stupor. Death.

Autopsy.—Dura-mater congested, and lymph at base of brain. Pus at base of brain, extending to the medulla.

Case 123.—Transactions American Otological Society. Treated by Roosa of New York City. Male, age twenty-five. Right ear. Chronic otorrhœa; pain in head and ear; profuse discharge; temperature and pulse medium; chills; pleurisy; pneumonia; pain over lateral sinus; exophthalmus. Death.

Autopsy.—Thrombosis of right internal jugular. Pus in right lateral sinus. Drum-head and ossicles gone. Right lateral sinus carious.

Case 124.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. age sixty-six. Right ear. Chronic otorrhœa; deafness on one side; went to bed as usual; next morning paralysis of one side, also ptosis; paralysis persisted for some days; became giddy; had severe chills; drowsy; delirious at intervals; face flushed; head hot; convulsions; gradually sank and died.

Autopsy.—Abscess in centre of right cerebral hemisphere.

Case 125.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Male, age twenty. Chronic otorrhœa; head and neck rigidly curved forward, and spine curved; some rotary movements of the head; was unable to swallow. Death.

Autopsy.—Abscess in the pons varolii.

Case 126.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Male, age twenty-two. Chronic otorrhœa; sore throat for one week, and became generally ill; discharge from ear; chills; semi-comatose condition. Death.

Autopsy.—Abscess in middle lobe.

Case 127.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Female, age

forty-one. Right ear. Chronic suppuration; paralysis of right half of face; constant pain on right side of head; drowsy; semi-comatose. Death.

Autopsy.—Abscess in the middle half of right lobe of cerebellum, communicating directly with the diseased portion of the temporal bone.

Case 128.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton.—Male, age twenty-three. Right ear. Chronic otorrhœa; caries of the temporal bone; chills; pain in the head; vomiting. Death.

Autopsy.—Abscess in the right lobe of cerebellum.

Case 129.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Male, age twenty-five. Right ear. Chronic otorrhœa; frontal headache; vertigo; delirium; paresis of left side; coma. Death.

Autopsy.—Abscess in the middle lobe of cerebrum on right side.

Case 130.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Female, age twenty-three. Right ear. Chronic otorrhœa; pain in right side of head and right ear; vomiting. Death.

Autopsy.—Suppuration and sloughing of the middle lobe of right hemisphere.

Case 131.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Female, age twenty. Right ear. Purulent otorrhœa; paralysis of right seventh nerve; pain in head; pain on moving neck; chills; nausea; vomiting; sweating. Death.

Autopsy.—Abscess in the cerebellum.

Case 132.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Male, age thirteen. Chronic otorrhœa; syncope; convulsions, with insensibility; pain in the head; nausea; delirium; convulsions; intense pain and cramp in left leg; coma. Death.

Autopsy.—Abscess under the posterior lobe of right hemisphere.

Case 133.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Male, age twenty-eight. Left ear. Chronic otorrhœa; delirium; coma. Death.

Autopsy.—Abscess in anterior and middle lobe of the left hemisphere. Caries of petrous bone connecting with abscess.

Case 134.—Extract from Treatise on the Ear, by Roosa. Male, age twenty-seven. Chronic otorrhœa; pain in head; paralysis of right side of face. Death from hæmorrhage (from lateral sinus).

Autopsy.—Dura-mater inflamed. A sloughing of brain tissue. Lateral sinus inflamed and sloughy.

Case 135.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Male, age eight. Left ear. Chronic otorrhœa; vomiting; convulsions; paralysis of left upper eye-lid; limbs all weak; pain in left ear; dull; drowsy; semi-comatose; coma. Death.

Autopsy.—Abscess in left cerebral hemisphere.

Case 136.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Female, age twenty-six. Right ear. Purulent otorrhœa; delirium; episthotonos; coma. Death.

Autopsy.—Abscess in under surface of middle cerebral lobe.

Case 137.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Female, age fifty-one. Left ear. Purulent otorrhœa; cough; pain in limbs; pulse quick; convulsions; coma. Death.

Autopsy.—Abscess in left cerebral hemisphere.

Case 138.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Female, age twenty-three. Left ear. Epilepsy; convulsions; pain in head; fever; intense agony; convulsions. Death.

Autopsy.—Abscess. Coagulum of fibrin and blood in left lateral sinus.

Case 139.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Male, age fifty-four. Right ear. Epilepsy; pain in forehead; stupor; lost consciousness and sensibility; convulsions. Death.

Autopsy.—Abscess in middle lobe of right hemisphere.

Case 140.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Female, age seven. Left ear. Purulent otorrhœa; great debility; epilepsy after syringing; epilepsy continued. Death.

Autopsy.—Abscess in under part of left lobe of the cerebellum.

Case 141.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Male, age not given. Right ear. Purulent otorrhœa; cessation of discharge; chills and collapse; pain in right side; stupid; coma. Death.

Autopsy.—Abscess in right middle lobe.

Case 142.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Female, age twenty-six. Right ear. Chronic otorrhœa; pain in ear; headache; dizziness; coma. Death.

Autopsy.—Abscess in upper part of right cerebral hemisphere.

Case 143.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Female, age nine. Left ear. Purulent otorrhœa; fever; vomiting; pain in ear; paralysis of left side; coma. Death.

Autopsy.—Abscess in middle lobe of left side of cerebrum.

Case 144.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Male, age thirty-two. Chronic otorrhœa; chills; fever; abscess behind ear; stupor; convulsions. Death.

Autopsy.—Abscess in middle cerebral lobe. Pus between diseased mastoid and dura-mater.

Case 145.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Male, age thirty-five. Right ear. Chronic otorrhœa; caries of the mastoid; polypus in external meatus; pain in back of head, neck, and shoulders of the right side; stupor; coma. Death.

Autopsy.—Abscess in right lobe of cerebellum.

Case 146.—Extract from Treatise on the Ear, by Roosa. Reported by Gull and Sutton. Male, age thirteen. Right ear. Purulent otorrhœa; fever; headaches; thick speech; hemiplegia; vomiting; drowsiness; pain; stupor. Death.

Autopsy. Three abscesses in right lobe of the cerebellum.

Case 147.—Extract from Treatise on the Ear, by Roosa. Treated by J. Orne Greene. Male, age twenty-eight. Right ear. Chronic otorrhœa; paralysis of the muscles of face after walk in rain; pain on right side of head; vertigo; chills; nausea; vomiting; coma. Death.

Autopsy.—Abscess in right half of the cerebellum. Roof of tympanum bare, but not carious.

Case 148.—Extract from Treatise on the Ear, by Roosa. Treated by J. Orne Greene. Male, age twenty-two. Right ear. Acute purulent otorrhœa; pain in ear; headache; difficulty in swallowing; vertigo; paralysis of right hypoglossal nerve.

Autopsy.—Meningitis. Caries of inner table of skull. Cochlea, and semi-circular canals filled with solid red mass.

Case 149.—Extract from Treatise on the Ear, by Roosa. Treated by Farwick. Female, age thirty-six. Left ear. Chronic otorrhœa; pain in ear and left side of head; vertigo; delirium. Death.

Autopsy.—Abscess in left cerebral hemisphere. Caries of the roof of tympanum.

Case 150.—Extract from Treatise on the Ear, by Roosa. Treated by Schwartze. Female, age eighteen. Left ear. Chronic otorrhœa; pain in ear; chills; region of left jugular sensitive; pain in swallowing; nausea; uvula œdematous; vomiting; singultus; left side of neck œdematous and painful on pressure. Slight convulsive movements of the left arm. Death.

Autopsy.—Clots in superior longitudinal and superior petrosal sinuses. Old thrombus in left lateral sinus.

Case 151.—Extract from Treatise on the Ear, by Roosa. Treated by Schwartze. Male, age three. Left ear. Purulent otorrhœa; meningitis. Death.

Autopsy.—(Edema of pia-mater. Left lateral sinus contained a thrombus. Carious bone in left auditory canal.

Case 152.—Extract from Treatise on the Ear, by Roosa. Treated by Schwartze. Female, age fifty-four. Right ear. Chronic otorrhœa; pain in ear and head; vomiting; vertigo; coma; ptosis of right side. Death.

Autopsy.—Hyperæmia of membranes of brain. Oedema of pia-mater. Thrombus in right superior petrosal sinus.

Case 153.—Extract from Treatise on the Ear, by Roosa. Treated by von Tröltzsch. Male, age fifty-three. Left ear. Chronic otorrhœa; polypus; pain in ear and head; coma. Death.

Autopsy.—Abscess in left middle cerebral lobe, connecting with petrous bone.

Case 154.—Extract from Treatise on the Ear, by Roosa. Treated by Von Tröltzsch. Male, age twenty-four. Left ear. Chronic otorrhœa; brain symptoms. Death.

Autopsy.—Carious perforation of roof of the tympanum. Abscess of the left inferior cerebral lobe.

Case 155.—Extract from Treatise on the Ear, by

Roosa. Treated by Von Troltsch. Female, age twenty-one. Right ear. Chronic otorrhœa; chills; œdema in the vicinity of the ear; swelling of sub-maxillary glands; delirium; dilatation of right pupil; coma. Death.

Autopsy.—Thrombus in right lateral sinus. Caries of roof of tympanum.

Case 156.—Extract from Treatise on the Ear, by Roosa. Surgeon's name omitted. Female, age twenty. Left ear. Chronic otorrhœa; headaches; vomiting; pain in ear and occiput; coma; delirium. Death.

Autopsy.—Abscess in left cerebellum and in left inferior cerebral lobe.

Case 157.—Extract from Treatise on the Ear, by Roosa. Treated by Cock. Male, age thirty-five. Chronic otorrhœa; pain in ear. Death.

Autopsy.—Sinuses congested. Right lateral sinus filled with a clot.

Case 158.—Extract from Treatise on the Ear, by Roosa. Treated by Cock. Sex not given. Age twenty. Chronic otorrhœa; symptoms not given.

Autopsy.—Caries. Phlebitis. Lateral sinus filled with pus. Gangrene of the brain.

Case 159.—Extract from Treatise on the Ear, by Roosa. Treated by Schwartz. Female, age four. Right ear. Chronic otorrhœa; fistula of mastoid; paralysis of facial nerve; brain symptoms. Death.

Autopsy.—Meningitis basilaris. Abscess in right middle lobe of cerebrum. Caries.

Case 160.—Extract from Treatise on the Ear, by Roosa. Treated by Schwartz. Female, age thirty-four. Right ear. Purulent otorrhœa; chills; vomiting; pain in right side of head; facial and pharyngeal paralysis. Death.

Autopsy.—Fistula of mastoid. Abscess in right middle lobe of cerebrum. Tegmen-tympani discolored and soft. Caries of mastoid cells.

Case 161.—Extract from Treatise on the Ear, by Roosa. Treated by Schwartz. Sex not given, age eight months. Left ear. Purulent otorrhœa; fistula of mastoid; vomiting; inanition; pneumonia; convulsions. Death.

Autopsy.—Exostosis of petrous bone. Caries of tympanum and mastoid. Connective tissue growths in vestibule.

Case 162.—*Ophthalmic Record*, March, 1892. Treated by J. Morrison Ray, of Louisville, Ky. Female, age 47. Right ear. Acute purulent otorrhœa; temperature and pulse medium; pain in right side of head; delirium; ptosis; divergent squint; dilated pupils; coma. Death.

Autopsy.—Purulent meningitis of frontal lobe. Pia opaque. Sulci filled with pus. Pus in tympanum.

Case 163.—Politzer on the Ear, page 538. Treated by R. Chimani. Male, age 30. Right ear. Chronic otorrhœa; pain in mastoid and occiput; vertigo; high fever. Later, tumor formed over mastoid, extending to center of parietal and occipital bones; incision; pus found; underlying bones roughened. Later, boring pains and heat flashes; disturbed vision; right exophthalmus. Later, pneumonia; jaundice; vomiting; delirium; unconsciousness; collapse. Death.

Autopsy.—Caries of right petrous. Rupture of sigmoid sinus. Thrombus of right transverse sinus, both carotid sinuses, circular sinus of Ridley, left cavernous sinus, superior petrosal sinus, and right ophthalmic vein. Purulent degeneration of the thrombi, and inflammation of the walls of the above named sinuses. Purulent infiltration of the connective tissue of the right orbit. Chronic œdema of pia-mater and arachnoid. Numerous pneumonic and gangrenous centers in both lungs.

Case 164.—Politzer on the Ear, page 539. Treated by Burkhardt-Merian, of Basle. Female, age twenty-

five. Left ear. Chronic otorrhœa; pain in left side of head, and mastoid; Wilde's incision; no pus. Later, collapse; swelling of left eye-lid; exophthalmus; pupil sluggish; mastoid opened; pus found. Later, swelling of right eye-lid, and right exophthalmus; upper eye-lid incised; found pus. Death.

Autopsy.—Cholesteatoma of tympanum, mastoid cells, transverse sinus, and incisura mastoidea. Thrombo-phlebitis of left transverse sinus and jugular veins. Basilar meningitis. Ichorous coagulum in inferior petrosal sinus and cavernous sinus. Phlebitis of ophthalmic veins on both sides.

Case 165.—Treated by J. Orne Greene. Female. Right ear. Chronic otorrhœa; pain in ear; vomiting; dizziness; chills; meatus swollen; pain and œdema over mastoid, and especially over mastoid foramen and adjacent occipital bone. Temperature and pulse elevated.

Operation.—Mastoid opened; no pus; improved. Later, pain and swelling over mastoid muscle. Death.

Autopsy.—Purulent swelling over clavicle. Purulent mastoid periostitis. Suleus of lateral sinus carious. Carious opening in tegmen-tympani. Thrombus in lateral sinus. Pus under dura-mater at sinus.

Case 166.—*Edinburgh Medical Journal*, November, 1879. Treated by Kirk Duncanson. Male, age thirty-seven. Left ear. Acute otorrhœa; swelling and redness over mastoid; pus came from an opening one-quarter of an inch in front of the membrana tympanum; pressure over mastoid caused the pus to flow more freely. Operation refused. Death.

Autopsy.—Pus in arachnoid space all over the brain. Dura healthy. Upper anterior surface of petrous was carious.

Case 167.—*Archives of Otology*, April, 1892. Treated by C. Truckenbrod, of Hamburg. Male, age fifty-four. Left ear. Previous history, deafness and tinnitus for ten days.

Diagnosis.—Exudation in tympanum; made a paracentesis; removed serum. Later, a furuncle developed in the meatus; tympanic discharge became purulent. Later, caught cold; pain in ear and head; temp. 104° ; enlarged opening in drum-head. Later, opening again enlarged; continued pain in head; vertigo; paresis of right facial; aphasia; temp. medium; paresis of right arm.

Operation.—Mastoid opened; no pus; no necrosis; roof of mastoid cavity opened; dura exposed; no pus; dura opened, and brain exposed; no pus; exploratory puncture made, forward and upward, and pus evacuated; orifice enlarged by knife, and drainage tube inserted; cavity antiseptically irrigated; iodoform gauze used. Recovery.

Case 168.—*Archives of Otology*, April, 1892. Treated by C. Truckenbrod, of Hamburg. Male, age twenty-nine. Left ear. Previous history not given. Pain over mastoid; temp. 103° ; pulse 92° ; drum-head injected; perforation of drum-head; violent pain in ear and head; painful mastoid; mastoid opened; pus liberated; transverse sinus seen at bottom of incision. Later, violent pain in temporal region; divergent strabismus of left eye. Later, temp. 99° ; pulse 55° ; ptosis of left upper lid; loss of sensibility over lower extremities. Skull trephined at temporo-parietal region; dura tense; dura incised; puncture of temporal lobe; pus evacuated. Improvement. Later, became worse; coma. Death.

Autopsy.—Pus at chiasm. Pus in lateral ventricles. Abscess in temporal lobe.

Case 169.—*Archives of Otology*, April, 1892. Treated by C. Truckenbrod, of Hamburg. Male, age twenty-five. Left ear. Previous history not given. Pain; aural suppuration; vomiting; mastoid tender; temp. 101° ; occasional unconsciousness; mastoid opened; pus evacuated. Improvement. Suspended breathing; artificial respiration; successful. Mastoid open-

TABULAR REPORT OF PURULENT BRAIN DEPOSITS, AND PHLEBITIS AND THROMBOSIS OF THE CEREBRAL VEINS AND SINUSES FOLLOWING EAR DISEASE.

No.	Where Reported.	Surgeon's Name, etc.	Sex.	Age.	Previous History.	Present History.	Result.	Autopsy.
1	Original	Allport, Minneapolis	F	25	L Chronic otorrhœa for twenty-two years	Deafness; bony narrowing of meatus; pain in head; chills; temp. and pulse medium; slight delirium; mastoid opening; found pus	Death	Necrosis found on outer surface of mastoid, squamous, frontal and sup. maxilla; on inner surface of squamous; on upper part of petrous; on petrous over middle and internal ears; on inner plate of mastoid. Pus found on outer surface of mastoid, squamous, frontal, and sup. maxilla. Pus generally distributed over left side of brain and first frontal fissure, first frontal convolution, fissure of Rolando, middle lobe on right side, both lateral ventricles, medulla and pons. Abscess on cerebellum. Abnormal openings existed through inner mastoid plate, through squamous, and between middle and internal ears and cranial cavity.
2	Original	Allport, Minneapolis	M	23	R Acute purulent otorrhœa	Pain in right side of head and ear; temp. and pulse medium; delirium; tender mastoid; mastoid opened; no pus found; squamous trephined; no pus found; skull trephined through mastoid and occipital bones; found pus	Death	Abscess of cerebellum. Pus around medulla. Dura-mater inflamed and adherent. Pia-mater inflamed. Carious opening in mastoid plate (inner). Carious opening between middle and internal ears and cranial cavity. Thrombi found in longitudinal sinus, Sylvian fissure, sup. petrosal sinus and right ventricle.
3	Original	Allport, Minneapolis	M	22	R Chronic otorrhœa	Pain in right side of head; temp. and pulse medium; delirium; mastoid swelled and inflamed; mastoid opened; found pus	D'ath fr. ty'd fev.	Dura-mater congested and adherent. Pia-mater congested. Thrombi in longitudinal and lateral sinuses.
4	Original	Allport, Minneapolis	M	34	R Chronic otorrhœa, with acute exacerbations	Pain in right side of head; temp. and pulse high; chills; delirium	Death	Necrosis of tympanum and lateral sinus. Ossicles gone. Pus in sup. petrosal and lat. sinuses. Dura-mater and pia-mater inflamed. Thrombus in sup. petrosal sinus.
5	Original	Allport, Minneapolis	M	25	R Blow on ear, followed by acute purulent otorrhœa	Temp. medium and sub-normal; pulse medium; pain in right ear, mastoid, and right side of head; mastoid swelled and tender; delirium; bowels loose; mastoid opened.	Death	Diffuse subdural abscess. Most marked in anterior parietal region, anterior to fissure of Rolando. Collections of pus on surface of r. frontal convolution, and r. temporal convolution. Purulent thrombus in the sup. sinus and in sup. longitudinal sinus. Adhesions between arachnoid and pia-mater. Carious opening from mastoid cells into lateral sinus.
6	Original	Allport, Minneapolis	M	35	L Mental condition bad on entrance to hospital, thus obscuring previous history; chronic otorrhœa; pain in head	Diarrhœa; chills; delirious; aphasia; incoherence; swelling under mastoid in neck; temp. and pulse medium	Death	Large vessels of dura and pia-mater filled with dark blood. Basilar artery and circle of Willis in same condition. Inferior surface of cerebellum purulent. Middle and internal ears purulent. Purulent thrombus in l. petrosal sinus, both sup. and inf. Same condition in lateral sinus and internal jugular vein. Purulent phlebitis of external jugular vein. The vein from auditory canal in the same condition. Pus in semi-circular canals. Thrombus of basilar vein. Superficial posterior auricular glands much enlarged.
7	Arch. Otology, 1885	Hedinger, Stuttgart	F	63	R Chronic otorrhœa; fibrous tumor in meatus; numbness r. side of neck and face. Patient disappeared for years. On re-appearance, had pain in ear; aural hemorrhage streaked with pus; total deafness r. ear; pain in back of head; pain and swelling of temporal region	Temp. and pulse medium; temporal swelling incised and pus liberated; cheek incised and pus liberated; mastoid muscle incised and pus liberated; mastoid opened and pus liberated; delirium; right pupil contracted; stupor; unconsciousness; spasms of l. upper and lower extremities; l. facial paresis	Death	Multiple pus sinuses in neck. Carious spots on outside of mastoid and occipital. Congestion of dura and pia-maters. R. sigmoid sinus, bulbous portion of jugular vein, and mastoid emissary vein, all obliterated. Tumor in middle ear. Malleus and incus gone. Pus in mastoid antrum. Carious canal leads from mastoid antrum into sigmoid fossa. Carious opening through incisura Santorini. Caries of pyramid. Caries of bony wall of transverse sinus.
8	Arch. Otology, 1885	Hedinger, Stuttgart	F	50	R Chronic otorrhœa	Vertigo; pain in head; marked in occipital region; temp. and pulse sub-normal; polypus in r. ear; removed; l. ear; chronic otorrhœa; simple; coma	Death	Hyperæmia of all meningeal veins. Carious opening in sup. petrosal sinus over vestibule. Petrous bone carious. Semi-circular canal, vestibule, and cochlea carious. Pus in middle cranial fossa running into the canal of the medulla. Abscess in left posterior cranial fossa. Cholesteatoma in l. mastoid antrum.
9	Arch. Otology, 1886	Truckenbrod	M	28	L Chronic otorrhœa; vertigo	Chills; painful spot on top of head; meatus narrowed; head aches; temp. medium; mastoid opened; found pus; paresis of r. side of face; difficult speech; defective memory; aphasia; diagnosis; brain abscess; operation; fistula directly above meatus enlarged; pus found	Recov'y	
10	Lancet, 1885	Hilles	F	19	Chronic otorrhœa		Death	Cerebral meningitis. Abscess of l. temporal lobe.
11	Lancet, 1880	Allen			R Chronic otorrhœa; deafness	Earache; head painful; vomiting; paraplegic; motor paralysis of lower limbs; scalp and spine painful to touch		Abscess beneath dura-mater on anterior surface of petrous bone. Drum-head and ossicles gone. Pus in middle ear, mastoid cells, and labyrinth. Pia-mater congested. Vertebrae in portions of cervical and dorsal spine carious.
12	Gazette des Hopit., 1880	Miot, Paris	M	35	R Chronic otorrhœa; tubercular	R. facial paralysis. Painful mastoid		Pus in middle ear and mastoid cells. Ossicles gone. Caries of tympanic walls. Dura-mater red, thickened and softened. Facial nerve and chorda tympani largely destroyed.
13	Jour. Anat. and Physiology, vol. xiv	McBride & Bruce			R Chronic otorrhœa			Pus in middle ear, mastoid cells, vestibule and cochlea. Abscess in outer half of r. cerebral hemisphere.
14	Arch. Otology, 1879	Kipp	M	23	R	Acute exacerbation; pain over r. side of head; meatus red; chills, fever, vomiting, headache; optic nerves congested; convulsions, unconsciousness, coma		Longitudinal sinus filled with blood. Abscess in temporal lobe. Not encapsulated. Pus in lateral sinus. Opening in anterior and outer wall of lateral sinus. Thrombus in lateral sinus. Pus in tympanum and mastoid cells. Malleus and incus carious.
15	Am. Otol. Society, 1882	Mathewson, Brooklyn	M	11		Mastoiditis; convulsions		Abscess of cerebellum. Pus between dura-mater and tegmen-tympani.
16	Am. Otol. Society, 1882	Merrill, Albany	M	32		Acute otitis		Pus over the region of the petrous bone, extending from the tympanic cavity through openings in tegmen tympani.
17	Am. Jour. Med. Sciences, 1882	Prentiss	M	32	R Chronic otorrhœa	Earache and headache; chills; temp. high; pain in temporal region and over r. eye		Abscess in anterior lobe of l. cerebellum. Caries of petrous bone. Clotted blood in lateral sinus. Carious opening in wall of lateral sinus, communicated with abscess.
18	Am. Jour. of Otology, 1882	Field, England	M	42	L			Congestion of dura-mater. Puro-lymph in pia-mater over l. sphenoidal lobe. Abscess in l. lobe of cerebellum. Temporal bone necrosed, especially in tympanum. Pus in middle ear. Drum-head gone.
19	Phila. Med. Times, 1881	Harlan	F	14	L	l. facial paralysis	Unconscious; maniacal; r. pupil contracted; mastoid swelled; Wilde's incision	Meningitis. Abscess of l. lobe of cerebellum. Almost entire destruction of anterior wall of ex. meatus. Drum-head gone. Caries of middle ear.
20	Edinburg Med. Jour., 1881	Sinclair	M	22	R	caught cold		Abscess communicating with middle ear in temporo-sphenoidal lobe.
21	Australian Med. Jour., 1881	Robertson	M	39	L		Deafness; purulent discharge from ear; l. facial paralysis	Caries in tympanum. Abscess in l. middle crus-cerebelli, extending partly into cerebellum and into pons, abutting on fourth ventricle and pressing on seventh nerve.
22	New York Med. and Sur. Brief, 1879	Moore	M	50	R Chronic otorrhœa	Acute exacerbation; mastoid abscess; opened; vomiting; semi-consciousness and facial paralysis; divergent strabismus; pupils contracted		Caries extending backward and upward from mastoid as far as parieto-occipital suture. Opening through parieto-occipital suture, leading into skull. Lateral sinus empty and hard. Meninges congested. Pus in posterior fossa between dura and skull. Caries at this point. Abscess of r. lobe of cerebellum.
23	Glasgow Med. and Sur. Jour., 1880	Barr	M	17	L		Pain, especially in l. side of forehead; languid and drowsy; vomiting, aphasia, epilepsy	L. sphenoidal lobe adherent to bone. Abscess in l. sphenoidal lobe. Petrous carious in two places, one through roof of tympanum, the other in groove for lateral sinus. The latter communicated with mastoid cells.
24	Jour. of Anat. and Phys., 1888	McBride & Bruce	F	R				Abscess in r. lobe of cerebellum.
25	Gazette des Hopit., 1885	Jaccoud		R		Pain and deafness; discharge; vomiting and dizziness; mastoid painful; fever		Pus at base of middle lobe of cerebrum. Tympanum purulent, granular, and carious. Drum-head gone.
26	Von Langenbeck's Arch., vol. 28	Gluck			R Chronic otorrhœa; aural hæmorrhages	Headache, fainting, convulsions, amaurosis, sopor, facial paralysis; paralysis of right arm; operation; posterior wall of meatus chiselled away; also portion of mastoid; dura exposed and fluctuating; pus between dura and pia		Purulent degeneration of dura, especially from longitudinal sinus to base of brain.
27	Arch. Otology, 1880	Michael, Hamburg	M		L Blow on head years ago; recovery ensued in a few days, with occasional pain on left side of head; discharge from both ears; deafness	Headache, starting on l. side; feeling of pressure; stupid, aphasia; head drawn downward into neck; face red, pupils sluggish; constipation; polypi in both ears; removed; spasms; unconsciousness; flexion of all four extremities; delirium, stupor, sensitive skin, pain upon moving back		A yellowish projecting spot existed somewhat above surface of dura, over the crista sup. of the petrous bone, corresponding to site of injury. Pia, at convexity, covered with pus. Abscess in l. temporo-sphenoidal lobe. Pus in ventricle. An opening existed outward from the corpus striatum communicating with abscess. Purulent degeneration of temporal lobe. Frontal lobe oedematous and softened. Lateral ventricle as well as 3rd and 4th, filled with pus. Pia at base charged with pus, extending down into vertebral canal. Both mastoids filled with pus.
28	Lancet, 1880	Morris	M	31	L Chronic otorrhœa; deafness	Pain; red mastoid; chills; unconsciousness; mastoid opened; pyæmia; herpes on face	Death	Thrombi in l. lateral sinus and jugular vein.
29	Arch. Otology, 1880	Frankel	F	23	L	Acute exacerbation, meningitis		Pus in tympanum. Opening through drum-head. Thrombo-phlebitis of transverse sinus. Abscess in subdural space and l. temporal lobe. Purulent lepto-meningitis of the base and convexity.

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30	Arch. Otology, 1880	Frankel	M	22	R	Chronic otorrhœa	Appearance of cerebral symptoms after knock on head	Death	Pus in tympanum. No perforation of drum-head. Incus gone. Caries of petrous bone through tegmen-tympani. Abscess in r. temporal lobe. Encapsulated. Thrombo-phlebitis of r. transverse sinus.
31	Arch. Otology, 1880	Frankel	F	28	R	" "	R. facial paralysis, vomiting, retained urine, dilated pupils, coma	"	Pus in tympanum. Perforation of drum-head. Caries of tegmen-tympani and ex. meatus. Inspissated exudation compresses facial nerve in Fallopian canal. Purulent basilar meningitis. Abscess in r. temporal lobe. Encapsulated. Mastoid sclerosed.
32	Arch. Otology, 1880	Frankel	M	53	L	" "	Polypus removed; headaches; mastoid opened; meningitis	"	Epithelioma of l. middle ear, with destruction of most of temporal bone. Purulent basilar meningitis.
33	Arch. Otology, 1880	Frankel	F	3	L	Pebble in ex. meatus; attempt at removal	Meningitis	"	Drum-head gone. Pebble in tympanum. Pus in tympanum. Purulent meningitis of convexity.
34	Am. Jour. Otology, 1879	Greene				Otitis media; polypus	Vomiting, pain, convulsions	"	Caries of tegmen-tympani. Perforation of dura-mater near transverse sinus. Abscess of temporal lobe.
35	Lancet, 1878	Gibbon	M	22	R	Chronic otorrhœa	Headache, nausea, paresis of lower extremities	"	Abscess in r. lobe of cerebellum. Caries of petrous at internal aud. meatus. Pus in mastoid.
36	Arch. fur Ohrenh., vol. 19	Burkner	M	46	R	" " pain in ear and head; deafness	Pain in ear and head; deafness; diminution of discharge; convulsions, delirium, coma; swelling over mastoid muscle	"	Necrosis in tympanum and ex. meatus. Dura near temporal bone injected, thickened, and purulent.
37	Arch. fur Ohrenh., vol. 19	Burkner	M	20	L	Chronic bilateral otorrhœa	Pain in l. ear; cessation of discharge; chills, vomiting, vertigo, high fever; thrombus felt in l. jugular; pain in neck; apathy; mastoid red and swelled; facial veins enlarged	"	Thrombi in transverse sinus and bulbous venæ jugularis. Caries of jugular fossa.
38	Arch. fur Ohrenh., vol. 19	Burkner	M	17	L	Acute purulent otorrhœa; l. facial paralysis	Granulations in tympanum; removed; later had pain in ear; cessation of discharge; return of bad symptoms; contraction of l. pupil; nystagmus of both eyes; somnolence; deafness; paresis of l. leg; paralysis of l. abducens; pain in all branches of trigeminus; vomiting	"	Pus around chiasm. Anterior extremity of l. lobe of cerebellum is adherent to posterior margin of temporal bone. Abscess in l. pons. At sup. border of temporal bone are three carious openings communicating with irregular cavity involving the entire posterior portion of temporal bone. This cavity is filled with a mass which infiltrates the posterior wall of temporal bone just above sigmoid sulcus, and is also connected with vestibule. Ossicles gone. Int. ear destroyed by gelatinous mass.
39	Am. Jour. Otology, 1881	Loring, N. Y. City	M		R	Influenza; deafness; closure of eustachian tubes; frequent similar attacks	Pain in ear and side of head; acute catarrhal otitis; delirium; drum-head punctured; no pus	Death	Congestion of dura at roof of tympanum. Sero-purulent exudation in sub-arachnoid space, extending from longitudinal fissure down side of brain. Pus in upper surface of r. lobe of cerebellum. Pseudo-membrane in tympanum.
40	Arch. der Heilk., vol. 2	Wendt	M	49	R		Tinnitus aurium; pain, deafness, unconsciousness, convulsions	"	Basilar meningitis.
41	Arch. der Heilk., vol. 2	Wendt	M	52	R	Acute catarrhal otitis	Pain; tinnitus aurium; found dead in bed.	"	Diffuse meningitis.
42	Arch. der Heilk., vol. 2	Wendt					Traumatic inflammation of middle ear.	"	Basilar meningitis.
43		de Rossi, Rome	F	57	L	Malaria; tinnitus aurium; acute otorrhœa	L. side of neck swelled; swelling incised and pus evacuated; pus comes from meatus on pressure of swelling; polypus in middle ear; middle ear connected by sinus with swelling; mastoid too sclerosed to open; chills	"	Congulated blood in left sinuses. Localized meningitis. Clot in jugular vein. Caries of atlas and 2d vertebra. Pus in cavum tympanum. Occipital condyles carious. Pus in mastoid cells. Transverse sinus surrounded by pus. Carious opening between mastoid antrum and sigmoid sinus.
44		de Rossi, Rome	F	18	R	Chronic otorrhœa	Pain in ear and side of head; fever; deafness; tympanic granulations; removed; headache, exophthalmia, ptosis; pain in head; painful swelling over mastoid muscle; coma	"	Dura adheres to bone. Pus in subdural space. Pus covers trigeminus and acoustic nerves. Dura at base covered with pus. Pus in sup. petrosal sinus, inferior cavernous sinus, and transverse sinus. Caries of tegmen-tympani. Pus in tympanum. Thrombi in longitudinal sinus and communicating veins. Abscess in inferior posterior side of frontal lobe.
45	King's Col. Hos. Reports	Pritchard, London	M	23	L	Chronic otorrhœa; frontal headache; pain in ear	Caught cold; increased discharge and pain; attacks of unconsciousness, with loss of speech; convulsions; twitching of l. side of face; semi-conscious; fits, drowsy, incoherent; tenderness on pressure, most marked about two inches above meatus; slight facial paralysis; operation; skull trephined two inches above and one-half inch in front of meatus; trephined again one inch behind original opening; pus found outside of dura; trephined again over occipital parietal region. No pus; dura always left intact	Recov'y	
46	King's Col. Hos. Reports	Pritchard, London	M	26	L	Chronic otorrhœa, pain in ear, and swelling of l. side of neck	Pain in ear and side of head; chills, vomiting, dizzy; aurial polypus; temperature medium; delirium; twitching of l. eyebrow and angle of mouth; retention of urine; semi-conscious; operation; trephined one and one-half inches behind meatus, and the same distance above the cerebral base line; pus evacuated; improvement; delirium, chills; wound re-explored; no pus; mastoid opened; no pus; paralysis of r. arm and leg; l. optic neuritis; track of original operation freely dilated; pus escaped	Recov'y	
47	Arch. Otology, 1882	Munson, Albany	F	39	L	Chronic otorrhœa. Has had partial l. facial paralysis	Pain in ear, vomiting, tinnitus-aurium, convulsions, right-sided headache, deafness, tympanic polypus; removal refused; delirium, unconsciousness, temp. and pulse high, coma, convergent strabismus l. eye, iris unresponsive	Death	Polypus of ex. meatus. Semi-circular canals carious. Abscess of middle lobe of cerebrum directly above semi-circular canals. Opening in meninges and brain tissue connecting the semi-circular canals and abscess.
48	Lancet, 1887	Gray		26	R	" " pain in and behind ear; facial paralysis	Fever, apathetic, half comatose, paralysis and anesthesia of l. leg, delirium; mastoid opened; no pus, coma, hemiplegia, hemi-anesthesia	"	Carious opening through tegmen-tympani. Abscess between dura and petrous. R. cerebral hemisphere covered with pus. Perforation of dura upon posterior surface of petrous.
49	Trans. of Am. Otol. Society	Pomeroy			R	" "		"	Diffused abscess of r. lobe of cerebellum. Tympanum carious. Carious opening through tegmen-tympani.
50	Arch. of Otology, 1889	Finlayson & Barr	M	22	R	" "	Acute exacerbation, fever moderate, giddy, pain in jaw and behind ear, vomiting, chills, pain in frontal and occipital regions, pain in back, head retracted, r. facial paralysis, constipation, stupor, vomiting	"	Pia congested. Purulent exudation in frontal convolution of both sides. Pus at base in region of medulla. Brain adherent near r. internal auditory meatus. Granulations in tympanum and mastoid antrum. Malleus and incus gone. Facial nerve disorganized and denuded of its bony covering. Mastoid cells obliterated and converted into sclerosed mass. Pus in antrum. Caries of tympanum. Caries of cribiform lamina. Carious aperture on upper part of petrous communicates with cochlea. Bone over sup. semi-circular canal is carious.
51	British Med. Jour., 1886	Gowers & Barker		19	R	Chronic otorrhœa; pain in and around ear	Fever, bilateral optic neuritis, vomiting, unequal pupils; mastoid opened; improvement, but unequal pupils and optic neuritis persisted; stupor, insomnia, delirium, chills; operation; skull trephined 1¼ inches behind and 1½ inches above center of meatus; aspiration needle introduced into temporal lobe inward, forward and downward; pus evacuated	Recov'y	
52	Arch. Otology, vol. 12	Knapp, N. Y. City	M	39	R	Acute purulent otorrhœa	Pain in ear and head, especially in r. occipital region; later pain, swelling and fluctuation in l. occipital region; incision at this point; pus liberated, bone denuded, wound kept open; improvement; later become worse; pus in occipital region came from interior of skull; frontal headaches, insomnia, nausea, pale, chills, fever, swelling below original opening; incised; pus found; improvement; became worse; optic neuritis both eyes; swelling appeared upward and backward from original opening; incised; pus found; probe passed into cranial cavity; pain in r. side of forehead, nausea, vomiting, delirium, coma	Death	The openings in the skull referred to in the history of the case were found. At outer surface of lateral sinus a streak of pus led along the transverse sulcus to large collection of pus at lowest part of sigmoid fossa. Pus in mastoid cells and tympanum. Abscess in middle and outer part of little brain. Not encapsulated.
53	Arch. Otology, 1880	Steinbrugge	M	58	R	Chronic otorrhœa	Vertigo, pain in r. parietal region and ear, neuralgia in third branch of r. trigeminus, cholesteatomatous masses in meatus and middle ear, l. arm and leg partially paralyzed, impaired vision, constipation, coma	Death	Fluid blood in all sinuses. Pia congested. R. temp. lobe adherent to petrous. Abscess in r. temp. lobe. Encapsulated. Surrounding brain substance sclerosed. L. optic nerve atrophied. Perforation through anterior surface of r. petrous and dura. Carious opening in semi-circular canals. Drum-head and ossicles gone. Tympanum necrosed so that it and mastoid antrum are thrown into one cavity, all filled with cholesteatoma.
54	Breslauer Aerzt. Zeits, 1879	Binswanger	M	51	R	Neither discharge from ears nor deafness has been observed	Fever, loss of appetite, vomiting, paralysis of l. arm, epilepsy, chronic convulsions, r. pupil dilated	"	Abscess in r. first frontal convolution. Encapsulated. Roof of r. tympanum inflamed. Granulations in r. tympanum and mastoid cells. Drum-head destroyed. Ossicles intact.

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55	Arch. fur Ohrenh., 1879, No's 11 and 12	Kretschy						Death	Purulent thrombus in L. transverse sinus. Pus in jugular sinus, and defect in its anterior wall leads to necrosed petrous. Cholesteatoma in tympanum. Fibrous tissue about jugular vein infiltrated with serum and pus.
56	Arch. fur Ohrenh., 1879, No's 11 and 12	Kretschy						"	Purulent infiltration of inner membranes of brain.
57	Arch. fur Ohrenh., 1879, No's 11 and 12	Kretschy						"	Abscess in l. cerebellum.
58		Burckhardt	F	19	L	Chronic otorrhoea	Died of meningitic symptoms after illness of 16 days	"	L. trigemini acousticus and facialis imbedded in pus. Purulent pia-mater. Thrombus in sup. sinus. Caries of petrosal sinus canal. Polypus in tympanum. Mastoid cells absent.
59		Burckhardt		2	L		Death from tubercular meningitis	"	Partial necrosis of l. wall of lateral sinus. Thrombas in lateral sinus. Carious openings of bony walls of sulcus transversus.
60		Burckhardt	F	7				"	Ossicles gone. Caries of mastoid process. Caries of parietal bone.
61		Burckhardt	F	2	L			"	Multiple caries on skull. L. drum-head gone. Malleus and incus gone. Necrosis of mastoid process.
62	Arch. Otology, 1879	Hartman	F	34	L	Chronic otorrhoea; occasional acute exacerbations	Painful mastoid, fever and chills, pain in l. temple, delirium	"	Anterior l. hemisphere covered with pus, extending to base of brain. Dura over l. tegmen-tympani discolored and pierced by openings, beneath which a cavity of pus was seen. Tegmen-tympani perforated by caries. Abscess in brain over tegmen-tympani, extending into lateral ventricle, which, with r. and middle ventricle, was filled with pus. Spinal cord bathed in pus. Polypus and necrosis in tympanum. Mastoid sclerosed.
63	Arch. Otology, 1879	Hartman	M	30	L	Chronic otorrhoea; violent pain in l. half of face, which led to facial paralysis	Pain in entire head; polypus in l. tympanum	Death	Purulent meningitis at posterior cerebral fossa. Abscess in l. cerebellum. Caries of bony wall of facial canal. Caries of semi-circular canal. Mastoid sclerosed.
64	Arch. Otology, 1879	Hartman	M	13	R	Chronic otorrhoea	Meningitis; swollen mastoid; Wilde's incision; pus liberated; delirium, coma	"	Pus patches over brain surface. Pus at base of brain, especially at r. of cerebellum. Abscess in middle cranial fossa. Pus at sella turcica and and l. middle cranial fossa. Necrosis of tegmen-tympani. Tympanum carious. Mastoid sclerosed.
65	Lancet, 1880	Field	M	18	R	"	Pain in head	"	Suppurative meningitis over r. petrous bone. Inner mastoid at lateral sinus carious. Thrombus in lateral sinus. Abscess of r. temporo-sphenoidal lobe and occipital lobe. Abscess in r. cerebellum. Incus and stapes gone.
66	Arch. Otology, 1880	Pooley	M	45	L	Blow on l. side of head, followed by deafness and otorrhoea	Painful ear; tinnitus aurium; drum-head perforated; mastoid swollen, red and painful; mastoid opened; pus found; not much fever	"	Abscess in l. middle lobe. L. sided pachymeningitis. Petrous carious, especially at outer half of middle surface. Pus in lateral ventricle of r. side of brain.
67	Am. Jour. Otology, 1881	Rodman, Waterbury	M	21	R	Chronic otorrhoea; occasional acute exacerbations	Mastoid symptoms; mastoid opened; pus found	"	Meningitis. Pus in neck between mastoid and styloid process. Caries in inner plate of mastoid at sulcus of lateral sinus. Caries of squamous. Lower surface of mastoid has 3 carious perforations in the groove next the tip of mastoid in the digastric fossa, all communicating with the carious mastoid cells. Mastoid antrum carious.
68	Deutsche Med. Wochens., 1890	Hoffman					He discovered in the course of an operation for mastoid abscess, an abscess in the occipital lobe, which he opened	Recov'y	
69	Dublin Med. Jour., 1890	Patterson					Pyæmia, following a suppurating ear	Death	Thrombus in lateral sinus.
70	Arch. fur Ohrenh., 1879	Burckhardt-Merian	F	19	L	Chronic otorrhoea	Meningitis	"	L. circumscribed basilar meningitis. Fistula between mastoid antrum and sup. petrosal sinus. Polypus in tympanum. No mastoid cells.
71	Arch. fur Ohrenh., 1879	Burckhardt-Merian			L	"	"	"	Caries of tympanum, antrum, mastoid cells, and osseous walls of lateral sinus. Thrombosis of lateral sinus. Tubercular meningitis.
72	Arch. fur Ohrenh., 1879	Burckhardt-Merian					"	"	Caries of tympanum and antrum. Carious opening through outer wall of mastoid. Caries of parietal bone. Meningitis.
73	Arch. fur Ohrenh., 1879	Burckhardt-Merian				Chronic otorrhoea	"	"	Necrosis of antrum and squamous. Meningitis
74	Med. Times and Gazette, 1880	Johnson	M	14	R	"	Chills, headache, thoracic pains, unsteady gait, constipation, night sweats, pupils dilated, delirium, coma, temp. and pulse not high	"	Double pleurisy. Pus in lungs, r. internal jugular vein, and tympanum. Abscess at apex of petrous bone. Necrosis of petrous near labyrinth. Blood coagulum in sigmoid sinus.
75	Med. Times and Gazette	Thompson	F	12	R	Tuberculous; chronic otorrhoea	Headache, vertigo, vomiting, dilated pupils, temp. and pulse medium, chills, involuntary defecation, cough, thoracic pains, coma, convulsions	"	Congestion of pia-mater. R. cerebellum adherent to dura. Abscess in r. cerebellum. Tubercular deposits in brain. Thrombus in r. internal jugular vein, sub-clavian vein, vena-cava, and r. auricle. Pus in r. half of posterior occipital fossa, r. sigmoid sinus, tympanum, vestibule, and semi-circular canals. Lungs abscessed.
76	Arch. Otology, 1888	Ferrer, San Francisco	M	60			Mastoid abscess; opened mastoid; found pus; death from	"	Pus and granulations in mastoid cells and tympanum. Meningitis.
77	Arch. Otology, 1888	Lewis, Birmingham					l. abscess	"	Abscess in temporo-sphenoidal lobe.
78	Arch. Otology, 1888	Lewis, Birmingham					Mastoid abscess	"	Phlebitis of lateral sinus.
79	Arch. Otology, 1888	Barr, Glasgow	M	21	L	Chronic otorrhoea	Headache, slow and intermittent pulse, normal or sub-normal temp., contraction of l. pupil, paresis of all ocular muscles except external rectus, partial r. facial paralysis, paresis of r. arm with wrist-drop; mastoid opened; no pus; skull trephined above ex. meatus; brain pierced with trocar; pus found	Recov'y	
80	Arch. Otology, 1888	Roosa, N. Y. City	F	42	L	Advanced Bright's disease	Acute otitis; drum-head lanced; pain and tenderness at junction of temporal and occipital bones; temp. medium	Death	Caries of tympanum. Pus in middle ear. 7th nerve exposed and imbedded in pus. No mastoid disease. Meningitis.
81	Brit. Med. Jour., 1888	Braker	M	30	R	Chronic otorrhoea; lateral sclerosis of spinal cord	Acute exacerbation, pain in r. half of head, vomiting, epilepsy, contraction of r. pupil; mastoid opened; no pus, emaciation, incontinence of urine, stupor, somnolence; operation; parietal bone trephined; dura incised; no pus; trephined again. 1½ inches above and 1¼ inches behind the ex. meatus; needle passed 1½ inches deep, forward and inward; pus found	Recov'y	
82	New York Med. Jour., 1887	Abbe					Acute otitis media; acute meningitis; choked disc on same side	Death	Purulent meningitis at base of cerebrum and lower surface of cerebellum. No evidence that pus had extended from ear. Internal auditory canal showed streaks of pus following the course of nerve. Diffuse purulent lepto-meningitis. Abscess in temp. lobe.
83	Arch. fur Ohrenh., vol. 26	Schmiegelow, Copenhagen	M		R	Chronic catarrhal otitis	Neuralgia of all three branches of r. trigeminous, followed by r. facial paralysis; r. choked disc; later, purulent otitis, pain, mastoid inflamed; mastoid opened; pus found; oedema of r. side of face; skull trephined at posterior cranial fossa; no pus; mastoid opening enlarged backward; improvement, nausea, fever, headache, vomiting, unconsciousness	"	
84	New York Med. Jour., 1886	Mathewson, Brooklyn	M	40	R	Chronic otorrhoea	Pain over mastoid; Wilde's incision; brain complications	"	Caries of tegmen-tympani. Abscess of brain over tympanum.
85	New York Med. Jour., 1886	Mathewson, Brooklyn	F	11	L	tympanic polypus	Spontaneous opening in ex. mastoid plate; facial paralysis; improvement; became worse; pain, vomiting, drowsiness, constipation, optic neuritis, convulsions	"	Dura-mater adherent to petrous. Pus in cerebellum.
86	New York Med. Jour., 1886	Mathewson, Brooklyn	M	5	R		Acute otitis media; drum-head not perforated	"	Caries of tegmen-tympani. Basilar meningitis.
87	British Med. Jour., 1887	Greenfield	M	26	L	Deafness	Headache, vomiting, ptosis, optic neuritis, sub-normal temp., semi-comatose; operation; skull trephined; dura incised; pus found	Recov'y	
88	Canada Lancet, 1881	Ryerson			L	Scarlet fever	Acute purulent otorrhoea; mastoid pain, swelling and tenderness; pain in head; ptosis r. eye; divergent squint right eye; both pupils dilated; coma; mastoid opened; pus found; improvement; later became worse; vision poor; optic discs swollen; fever, delirium	Death	Dura adherent to skull. Pus on surface of both sup. lobes. Purulent thrombi in lateral sinus.
89	Arch. fur Ohrenh., vol. 26	Wagenhauser			L		Acute otorrhoea; mastoid operation	"	Purulent meningitis. Inner plate of mastoid carious and perforated. Inner surface of petrous covered with granulations.
90	Arch. Otology, 1891	Friedenwald, Baltimore	M	17	L	Chronic otorrhoea; had abscess lanced behind ear years ago	Pain, dizziness, aural polypi, left-sided deafness, chills, headache, temp. and pulse medium, tenderness behind ear; later, chills and high fever; operation after Von Bergmann, viz.: from a point 4 c.m. behind ex. meatus in a line made with the lower margin of the orbit, ascend perpendicularly for 5 c.m. to reach point for trephening; no pus; mastoid opened; pus and cholesteatoma found	"	Pus in pia, covering surface of l. frontal and parietal lobes. Perforation of inner mastoid plate. Purulent thrombus in lateral sinus.

TABULAR REPORT OF PURULENT BRAIN DEPOSITS, AND PHLEBITIS AND THROMBOSIS OF THE CEREBRAL VEINS AND SINUSES FOLLOWING EAR DISEASE.

No.	Where Reported.	Surgeon's Name, etc.	Sex.	Age.	Ear.	Previous History.	Present History.	Result.	Autopsy.
91	Arch. Otolology, 1879	Pierce	F	34	L	Chronic otorrhœa	Hard swelling in front of ear; granulations in meatus concealed necrosis; pain in l. cheek and parietal bone; l. facial paralysis; pain in vertex and occipital region; carious bone discharged from ear; meatus very carious; later, the entire area of disease had fallen in, comprising the ex. meatus up to the level of the drum-head, exposing the temporo-maxillary articulation; condyle of the ramus of the jaw now exposed. The area of disease was now almost large enough to admit the closed fist; hernia cerebri appeared; paralysis of r. side with aphasia; constipation	Death	Destruction of bony and other tissues terrific; even aqueductus fallopii, semi-circular canal and carotid canal were exposed. Hernia of temporo-sphenoidal lobe.
92	Trans. Am. Otol. Society	Sexton, N. Y. City					Purulent otorrhœa; caries of attic, antrum and tympanum; lymphadenoma; facial paralysis	Death	Inner wall of attic gone. Semi-circular canals exposed. Caries of antrum and mastoid cells. Purulent meningitis.
93	Am. Otol. Society, 1887	Roosa, N. Y. City	M	11	R		Painful swelling over ear; abscess opened; no fistula	"	Abscess of temporo-sphenoidal lobe. Encapsulated. Drum-head perforated. Upper meatus necrotic. Necrosis at juncture of mastoid and squamous. Caseous pus in meatus and mastoid cells.
94	Med. Times, 1885	Parker			R		Abscess above ear; opened; convulsions, coma.	"	Necrosis of floor of middle temporal fossa, corresponding to position of middle ear. Adhesion between brain and dura. Perforation of dura. Abscess in temp. lobe. Mastoid cells filled with cheesy debris.
95	Arch. Otolology, 1884	Sutphen	M	44	B	Chronic otorrhœa	Acute exacerbation, pupils contracted, aphasia, 7th nerve on l. side paralyzed, choked discs both eyes, necrosis l. ex. meatus, paralysis r. arm and leg; opening made into cranial cavity by way of meatus and mastoid; no pus found	"	Abscess in anterior and middle lobes of l. hemisphere. Encapsulated. Necrosis of petrous.
96	Arch. Otolology, 1884	Sutphen	M	21	R	"	Acute exacerbation, paralysis of r. abducens, impaired vision of both eyes, both discs swollen, fever, chills, coma; probe can be passed into cranial cavity by way of upper meatus; no pus.	"	Thrombi in r. lateral and sup. longitudinal sinuses. Caries in sulcus for lateral sinus. Necrosis of sup. wall of petrous. Caries of meatus, tympanum, and walls of mastoid.
97	Arch. Otolology, 1881	Moss, Heidelberg	M	23	L	"	polypus; paralysis l. facial nerve; deafness l. ear	"	Abscess in l. cerebellum. Encapsulated.
98	Arch. Otolology, 1884	Hedinger	M		L		Acute purulent otorrhœa, fever, fluctuating swelling of l. parotid gland; opened; found pus; pus may be forced from swelling into ex. meatus; coma	"	Pus under dura and arachnoid, and in antrum and tympanum. Purulent thrombus in sup. petrosal sinus. Ulcer in this sinus communicating with pyramid. Carious opening connects cranial cavity and tympanum, and mastoid antrum. Ulcer in transverse sinus. Ex. meatus carious.
99	Arch. Otolology, 1884	Hedinger	F		L		Acute purulent otorrhœa, fever, polypus; removed; granulations; swelling of glands below ear, and frequent attacks of pain in entire l. half of head; vertigo; death from tuberculo sis	"	Ex. meatus carious. Between bulbous venæ jugularis and bony portions of Eustachian tube there were two fistulas leading into pyramid. Tympanum carious and purulent. Internal wall of carotid canal carious. Thrombus in carotid artery. Cheesy pus in mastoid antrum.
100	Arch. Otolology, 1885	Rothholz	M	20	R	Chronic otorrhœa	Pain in vertex, deaf, drum-head gone, polypus, partial paralysis of auditory nerve, temp. and pulse nearly normal, constipation, stupor, delirium, unconsciousness, divergent strabismus, herpes on r. cheek	"	Dura congested. Purulent lepto-meningitis, especially at base. Communicating abscess in r. cerebellum. Encapsulated. Drum-head gone. Pus and polypus in tympanum. Ossicles gone. Chorda-tympani destroyed. Pus in Fallopiian canal. Facial nerve exposed in tympanum. Facial nerve looks normal in tympanum, but from gangliform swelling to internal auditory meatus it is inflamed. Acoustic nerve presents the same general appearances. Pus in vestibule and cochlea. Petrous bone saturated with pus.
101	Arch. Otolology, 1886	Sutphen	M	25	R	Chronic otorrhœa; from blow on ear; four years before had abscess behind ear, which was opened and healed; swelling recently recurred, with pain	Meatus swelled; granulations and necrosis in tympanum; abscess opened; communication with tympanum established; improvement; later became worse; a fistulous opening existed just below ex. meatus, through which pus escaped; carious bone in this fistula; water injected into meatus escaped into mouth and fistula; vomiting, headache, aural hæmorrhage, fever, pain, delirium	Death	The bone in region of middle ear has been changed into one large carious cavity. Opening into internal carotid artery. Cerebellum abscess communicating with carious cavity.
102	Arch. Otolology, 1880	Pooley	M	30	R	Chronic otorrhœa	Pain in r. ear and r. side of head; mastoid swollen and tender; deaf; Wilde's incision; carious bone found; trephining refused; chills, delirium; mastoid opened; pus found; coma	Death	Meningitis at convexity and base. Red inflammatory softening at apex of temporal bone. Upper surface of cerebellum inflamed. Pus in plamater, arachnoid, tympanum, mastoid antrum and cells, vestibule, semi-circular canals, Eustachian tube, and canal for tensor-tympani. Necrosis in tympanum. Incus and stapes gone.
103	Arch. Otolology, 1887	Barr & McEwen, Glasgow	M	9	R	"	Acute exacerbation; mastoid abscess; opened; found pus; no improvement; fever slight; ptosis of r. eye; paresis of l. internal rectus and l. orbicularis; veins r. side of head congested; r. mastoid muscle rigid; pain on pressure of vein passing through posterior condyloid foramen; dense stupor; pulse slow and feeble; constipation; operation; skull trephined 1½ inches above and ½ inch behind the center of ex. meatus; dura opened; dura and pia congested; aspiration needle passed toward eminence of petrous bone; pus found ¾ inch deep; at same time skull again trephined just above osseous boundary of ex. meatus, involving squamo-petrosal suture; abscess reached	Recov'y	
104	Arch. Otolology, 1889	McEwen, Glasgow	M	17	L	Chronic otorrhœa	Unconscious, weak and slow pulse, optic neuritis, nearly moribund, carious sinus into mastoid cells, vomiting, pain in head, chills, l. hemiplegia; mastoid opened, carious matter expelled, lateral sinus exposed, on which were found granulations; the bone was then perforated further back than the groove for lateral sinus; pus escaped from over the cerebellum	Recov'y	
105	British Med. Jour., 1879	Barr, Glasgow	M	17	L	"	Vomiting, pain in head, stupor, tremors, convulsions	Death	L. temporo-sphenoidal lobe adherent to bone beneath. Abscess in temporo-sphenoidal lobe. Encapsulated. Two carious openings in temporal bone; one through tegmen tympani, the other in groove for lateral sinus, communicating with mastoid cells.
106	Glasgow Med. Jour., 1880	Barr, Glasgow	M	14	L	"	Vomiting, pain, coma, spasmodic contraction of flexors of arms and legs	"	Abscess in temporal lobe. Polypus in tympanum. Drum-head and stapes gone.
107	Glasgow Med. Jour., 1880	Barr, Glasgow	"	17	L	"	Aphasia, constipation, unconsciousness, paresis of r. side, coma	"	Abscess in l. temporal lobe. Carious fistulæ in roof of antrum, sigmoid flexure, and posterior wall of exterior meatus. All fistulæ communicate with mastoid cells.
108	Glasgow Med. Jour., 1880	Barr, Glasgow	"	12	L	"	Pain in mastoid and occiput, chills, vomiting, constipation	"	Pus beneath dura on posterior surface of l. petrous bone. The walls of the l. lateral sinus were thickened and detached from the bone by underlying pus. Mastoid cells filled with cheesy pus.
109		Rommel			R	"	Temp. and pulse medium, pain in head and neck, œdema and tenderness over mastoid, r. facial paralysis, œdema of r. upper eyelid, delirium, anæsthesia r. half of face, diarrhœa	"	Caries of tympanum. Phlebitis of jugular vein. Thrombus in r. lateral sinus, extending in through inferior petrosal sinus to r. cavernous sinus, thence through circular sinus to l. cavernous sinus, which was filled with disorganized clots and pus.
110		Taylor			"	"	Delirium, strabismus, diplopia, sudden rise and fall of temp., retinal veins large and tortuous	"	Thrombosis of lateral sinus and jugular vein. Lung abscess.
111		Moss, Heidelberg			R		Acute otitis, pain in r. forehead and temple, chills, constipation, somnolence, impaired vision, delirium, sudden rise and fall of temp.	"	Thrombosis r. lateral sinus and internal jugular vein. Phlebitis of emissary mastoid vein.
112		Moss, Heidelberg			R	Chronic otorrhœa	Pain in r. side of head	"	Thrombosis of sigmoid flexure and r. lateral sinus. Lepto-meningitis.
113		Moss, Heidelberg			R	"	Chills, pain in occiput, vomiting	"	Phlebitis and thrombosis of lateral sinus. Meningitis. Cholesteatoma in mastoid cells.
114		Moss, Heidelberg			"	"	Pain in ear, forehead and occiput, fever, œdema of temple, headache, stupor, spasms of upper extremities	"	Phlebitis and thrombosis of lateral and sup. petrosal sinuses. Circumscribed basilar meningitis.
115		Burckhardt-Merian			1	L	External opening made over mastoid, vomiting, delirium, nose-bleed	"	Tubercular meningitis. Thrombosis of l. lateral sinus.
116	Am. Otol. Society	Kipp	F	28	L		Furuncle l. meatus, pain in head	"	Inflammation of arachnoid and pia-mater. Abscess anterior portion of cerebelum. L. auditory and facial nerves imbedded in pus. Pus in mastoid cells. Slight tympanic inflammation.
117	Med. Corr. Blatt. von Wurttemberg, 1889	Koebel, Stuttgart				Chronic otorrhœa	Pain, facial paralysis; mastoid opened; caries of cells, antrum and tympanum; pyæmia	"	Carious openings into middle cerebral fossa and into transverse sinus. Phlebitis and thrombus of transverse sinus.

TABULAR REPORT OF PURULENT BRAIN DEPOSITS, AND PHLEBITIS AND THROMBOSIS OF THE CEREBRAL VEINS AND SINUSES FOLLOWING EAR DISEASE.

No.	Where Reported.	Surgeon's Name, etc.	Sex.	Age.	Ear.	Previous History.	Present History.	Result.	Autopsy.
118	Medical Record, 1877	Roosa, N. Y.	M	41	R		Acute purulent otorrhœa; meningitic symptoms, chills, temp medium, pulse low; Wilde's incision; delirium, pyæmia	Death	Fibrino-purulent exudation in pia. Coagula in sinuses. Lateral ventricle dilated and filled with blood-stained serum. Tegmen-tympani carious. Lateral sinus carious.
119	Am. Otol. Society, 1871	Greene	"	25		Chronic otorrhœa	Deaf, dizziness, headache, diplopia, partial paralysis, coma	"	Abscess in temporo-sphenoidal lobe. Necrosis tegmen-tympani. Sinus connecting auditory canal and cerebral cavity.
120	Roosa on the Ear, p. 532	Roosa, N. Y. City	"	L	"	" mastoid abscess when young	Pain, high fever	"	Pus under dura and in mastoid cells. Temporal bone infiltrated with pus. Drum-head, malleus, incus, and part of stapes gone.
121	Roosa on the Ear, p. 532	Roosa, N. Y. City	"	R	"		Acute purulent otorrhœa, pain in r. side of head, delirium, retention of urine, temp. and pulse medium	"	R. optic nerve atrophied. Meninges at base of cerebellum and upper part of spinal cord, covered with lymph and sero-pus. Malleus and incus gone.
122	Treat. on Ear, by Roosa	Cooper	M	65	"		Acute purulent otorrhœa, pain behind ear and in head, stupor.	"	Dura congested. Lymph at base. Pus at base, extending to medulla.
123	Am. Otol. Society	Roosa, N. Y. City	"	25	"	Chronic otorrhœa	Pain in head and ear, temp. and pulse medium, chills, pleurisy, pneumonia, pain over lateral sinus, exophthalmus	"	Thrombus of r. internal jugular. Pus in r. lateral sinus. Drum-head and ossicles gone. R. lateral sinus carious.
124	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	"	66	"	"	deafness on one side	"	Abscess in center of r. cerebral hemisphere.
125	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	"	30	"	"	Paralysis of one side, ptosis, giddy, chills, drowsy, delirium, face flushed, head hot, convulsions	"	
126	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	"	22	"	"	Head and neck rigidly curved forward, and spine curved; rotary movements of head; unable to swallow	"	Abscess in pons varolli.
127	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	"	22	"	"	Sore throat for one week, and became generally ill; chills, semi-coma	"	Abscess in middle lobe.
127	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	F	41	R	"	Paralysis of r. half of face; pain in r. side of head, drowsy, semi-coma	"	Abscess in middle half of r. lobe of cerebellum, communicating directly with diseased temporal bone.
128	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	M	23	"	"	Caries of temporal bone, chills, pain in head, vomiting	"	Abscess in r. lobe of cerebellum
129	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	"	25	"	"	Frontal headache, vertigo, delirium, paresis of l. side, coma	"	Abscess in r. middle lobe of cerebrum.
130	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	F	23	"	"	Pain in r. side of head and r. ear, vomiting	"	Suppuration and sloughing of r. middle lobe of hemisphere.
131	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	"	20	"	"	Paralysis of r. 7th nerve, pain in head, pain on moving neck, chills, nausea, vomiting, sweating	"	Abscess in cerebellum.
132	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	M	13	R	"	Syncope, convulsions with insensibility, pain in head, nausea, delirium, convulsions, pain and cramp in l. leg, coma	"	Abscess of the posterior lobe of r. hemisphere.
133	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	"	28	L	"	Delirium, coma	"	Abscess in anterior and middle lobe of l. hemisphere, communicating with carious petrous.
134	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	"	27	"	"	Pain in head, paralysis of r. side of face; death from hæmorrhage from lateral sinus	"	Dura inflamed, sloughing of brain tissues. Lateral sinus inflamed and sloughy.
135	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	"	8	L	"	Vomiting, convulsions, paralysis of l. upper eyelid, limbs weak, pain in ear, dull, drowsy, semi-coma, convulsions	"	Abscess in l. cerebral hemisphere.
136	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	F	26	R	"	Delirium, episthotosis, coma	"	Abscess in under surface of middle cerebral lobe.
137	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	"	51	L	"	Cough, pain in limbs, pulse quick, convulsions, coma	"	Abscess in l. cerebral hemisphere.
138	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	"	23	"	Epilepsy	Convulsions, pain in head, fever, agony, convulsions	"	Abscess. Coagulum of fibrin and blood in l. lateral sinus.
139	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	M	54	R	"	Pain in forehead, stupor, lost consciousness and sensibility, convulsions	"	Abscess in middle lobe of r. hemisphere.
140	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	F	7	L	Chronic otorrhœa; great debility	Debility, epilepsy	"	Abscess in under part of l. lobe of cerebellum.
141	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	M	"	R	"	Cessation of discharge, chills and collapse, pain in r. side, stupid, coma	"	Abscess in r. middle lobe.
142	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	F	26	"	"	Pain in ear, headache, dizzy, coma	"	Abscess in upper part of r. cerebral hemisphere.
143	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	"	9	L	"	Fever, vomiting, pain in ear, l. sided paralysis, coma	"	Abscess in middle lobe of l. side of cerebrum.
144	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	M	32	"	"	Chills, fever, abscess behind ear, stupor, convulsions	"	Abscess in middle cerebral lobe. Pus between diseased mastoid and dura-mater.
145	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	"	35	R	"	caries of mastoid; polypus in ex. meatus	"	Abscess in r. lobe of cerebellum.
146	Treat. on Ear, by Roosa	Rep. by Gull & Sutton	"	13	"	"	Pain in back of head, neck and shoulders of r. side, stupor, coma, Fever, headache, thick speech, hemiplegia, vomiting, drowsy, pain, stupor	"	Three abscesses in r. lobe of cerebellum.
147	Treat. on Ear, by Roosa	Greene	"	28	"	"	paralysis of muscles of face after walk in rain	"	Abscess in r. half of cerebellum. Roof of tympanum bare, but not carious.
148	Treat. on Ear, by Roosa	Greene	"	22	"	Acute purulent otorrhœa	Pain in r. side of head, vertigo, chills, nausea, vomiting, coma.	"	Meningitis. Caries of inner table of skull. Cochlea and semi-circular canals filled with solid red mass.
149	Treat. on Ear, by Roosa	Farwick	F	36	L	Chronic otorrhœa	Pain in ear, headache, difficulty in swallowing, vertigo, paralysis of r. hypoglossal nerve	"	Abscess in l. cerebral hemisphere. Caries of roof of tympanum.
150	Treat. on Ear, by Roosa	Schwartz	"	18	"	"	Pain in ear and l. side of head, vertigo, delirium	"	Clots in sup. longitudinal and sup. petrosal sinus. Old thrombus in l. lateral sinus.
151	Treat. on Ear, by Roosa	Schwartz	"	18	"	"	Chills, left side of neck oedematous and painful on pressure, especially over jugular; painful swallowing, nausea, uvula oedematous, vomiting, singultus, convulsion of l. arm	"	
151	Treat. on Ear, by Roosa	Schwartz	"	18	"	"	Meningitis	"	
152	Treat. on Ear, by Roosa	Schwartz	"	18	"	"	Pain in ear and head, vomiting, vertigo, coma, ptosis of r. eye	"	Edema of pia-mater. L. lateral sinus contained a thrombus. Carious bone in l. auditory canal.
153	Treat. on Ear, by Roosa	Von Troeltsch	"	18	"	"	Brain symptoms	"	Hyperæmia of membranes of brain. Edema of pia-mater. Thrombus in r. sup. petrosal sinus.
154	Treat. on Ear, by Roosa	Von Troeltsch	"	18	"	"	Chills, oedema near ear, swelling of sub-maxillary glands, delirium, r. pupil dilated, coma	"	Abscess in l. middle cerebral lobe, connecting with petrous bone.
155	Treat. on Ear, by Roosa	Von Troeltsch	"	18	"	"	Headache, vomiting, pain in ear and occipit, coma, delirium	"	Carious perforation of roof of tympanum. Abscess of l. inferior cerebral lobe.
156	Treat. on Ear, by Roosa	Cock	"	18	"	"	Pain in ear	"	Thrombus in r. lateral sinus. Caries of roof of tympanum.
157	Treat. on Ear, by Roosa	Cock	"	18	"	"	Mastoid fistula, paralysis of facial nerve, brain symptoms	"	Abscess in l. cerebellum and in l. inferior cerebral lobe.
158	Treat. on Ear, by Roosa	Cock	"	18	"	"	Chills, vomiting, pain in r. side of head, facial and pharyngeal paralysis	"	Sinuses congested. R. lateral sinus filled with a clot.
159	Treat. on Ear, by Roosa	Schwartz	"	18	"	"	Mastoid fistula, vomiting, inanition, pneumonia, convulsions	"	Caries. Phlebitis. Lateral sinus filled with pus. Gangrene of brain.
160	Treat. on Ear, by Roosa	Schwartz	"	18	"	"	Chills, vomiting, pain in r. side of head, facial and pharyngeal paralysis	"	Meningitis basilaris. Abscess in r. middle lobe of cerebrum. Caries.
161	Treat. on Ear, by Roosa	Schwartz	"	18	"	"	Mastoid fistula, vomiting, inanition, pneumonia, convulsions	"	Fistula of mastoid. Abscess in r. middle lobe of cerebrum. Tegmen-tympani discolored and soft. Caries of mastoid cells.
162	Ophthalmic Record, March, 1892	J. Morrison Ray, Louisville, Ky.	F	47	R	Acute purulent otorrhœa	Temp. and pulse medium, pain in r. side of head, delirium, divergent squint, dilated pupils, coma	"	Exostosis of petrous bone. Caries of tympanum and mastoid. Connective tissue growths in vestibule.
163	Politzer on the Ear, page 538	R. Chimani	M	30	"	Chronic otorrhœa	Pain in mastoid and occipit, vertigo, high fever, later tumor formed over mastoid, extending to center of parietal and occipital bones; incision; pus found, underlying bones roughened; later, boring pains and heat flashes, disturbed vision, r. exophthalmus; later, pneumonia, jaundice, vomiting, delirium, unconsciousness, collapse	"	Purulent meningitis of frontal lobes. Pia opaque. Sulci filled with pus. Pus in tympanum.
164	Politzer on the Ear, page 539	Burckhardt-Merian, Basle	F	25	L	Chronic otorrhœa	Pain in l. side head and mastoid, Wilde's incision, no pus; later, collapse, swelling of l. eye-lid, exophthalmus, pupil sluggish; mastoid opened, found pus; later, swelling of r. eye-lid and r. exophthalmus; upper eye-lid incised, found pus	"	Caries of r. petrous. Rupture of sigmoid sinus. Thrombus of r. transverse sinus, both carotid sinuses, cavernous sinus of Ridley, l. cavernous sinus, sup. petrosal sinus, and r. opthalmic vein. Purulent degeneration of thrombi, and inflammation of walls of above named sinuses. Purulent infiltration of connective tissue of r. orbit. Chronic edema of pia-mater and arachnoid. Numerous pneumonic and gangrenous centres in both lungs.
165		J. Orne Greene	"	"	R	Chronic otorrhœa	Pain in ear, vomiting, dizziness, chills, meatus swollen, pain and oedema over mastoid, and especially over mastoid foramen and adjacent occipital bone, temp. and pulse elevated; operation; mastoid opened, no pus, improved; later, pain and swelling over mastoid muscle	"	Cholesteatoma of tympanum, mastoid cells, transverse sinus, and incisura mastoidea. Thrombo-phlebitis of l. transverse sinus and jugular veins. Basilar meningitis. Ichorous coagulum in inferior petrosal sinus and cavernous sinus. Phlebitis of ophthalmic veins on both sides.
166	Edinburgh Med. Jour., Nov., 1879	Kirk Duncanson	M	37	L	Acute otorrhœa	Swelling and redness over mastoid; pus came from an opening one-quarter of an inch in front of the membrana tympanum; pressure over mastoid caused the pus to flow more freely; operation refused	"	Purulent swelling over clavicle. Purulent mastoid periostitis. Sulcus of lateral sinus carious. Carious opening in tegmen-tympani. Thrombus in lateral sinus. Pus under dura-mater at sinus.
167	Arch. Otol., April, 1892	C. Truckenbrod, Hamburg	"	51	"	Deafness and tinnitus for ten days	Diagnosis: Exudation in tympanum; made a paracentesis; removed serum later; a furuncle developed in the meatus; tympanic discharge became purulent; later, caught cold; pain in ear and head; temp. 104°; enlarged opening in drum-head; later, opening again enlarged; continued pain in head; vertigo, paresis of r. facial; aphasia; temp. medium; paresis of r. arm; operation; mastoid opened; no pus, no necrosis; roof of mastoid cavity opened, dura exposed; no pus; dura opened and brain exposed; no pus; exploratory puncture made, forward and upward, and pus evacuated; orifice enlarged by knife, and drainage tube inserted; cavity antiseptically irrigated; iodoform gauze used	Recov'y	Pus in arachnoid space all over brain. Dura healthy. Upper anterior surface of petrous carious.
168	Arch. Otol., April, 1892	C. Truckenbrod, Hamburg	M	29	L		Pain over mastoid; temp. 103°; pulse 92°; drum-head injected; perforation of drum-head; violent pain in ear and head; painful mastoid; mastoid opened, pus liberated; transverse sinus seen at bottom of incision; later, violent pain in temporal region; divergent strabismus of l. eye; later, temp. 99°; pulse 53°; ptosis of l. upper lid; loss of sensibility over lower extremities; skull trephined at temporo-parietal region; dura tense; dura incised; puncture of temporal lobe; pus evacuated; improvement; later, became worse, coma, death	Death	Pus at chiasm. Pus in lateral ventricles. Abscess in temporal lobe.
169	h. Otol., April, 1892	C. Truckenbrod, Hamburg	M	25	L		Pain, aural suppuration, vomiting; mastoid tender; temp. 101°; occasional unconsciousness; mastoid opened, pus evacuated; improvement; suspended breathing; artificial respiration; successful; mastoid opening enlarged; dura exposed; exploratory needle introduced, upward and backward; pus evacuated	Death	Abscess of cerebellum. Pus in sulcus for transverse sinus. Thrombus in transverse sinus. Necrotic opening through tegmen-tympani.

ingenlarged; dura exposed; exploratory needle introduced, upward and backward; pus evacuated. Death.

Autopsy.—Abscess in cerebellum. Pus in sulcus for transverse sinus. Thrombus in transverse sinus. Necrotic opening through tegmen-tympani.

It has been interesting to note the relative frequency of males and females to these diseases, and my statistics show the following:

Males.	86 cases.
Females	46 “
Sex not stated	37 “
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169 cases.	

The extra liability of males to diseases of this character is probably due to the increased exposures incident to male life.

More cases occurred at the ages of twenty-three and twenty-five, and the average age appears to be between nineteen and twenty.

The ages most frequently involved are from seventeen to twenty-six inclusive, which is perhaps due to youthful indiscretions and the increased exposures common to this period.

These statistics show a proneness to such diseases during the first three years of life, which is probably due to the thin character of the cranial bones, the tendency to middle ear abscesses during childhood, and the inability to give to babes suffering from aural complaints the care possible in later life.

As to which ear is most frequently involved, the statistics show as follows:

Right ear.	81 cases.
Left ear	69 “
Ear not stated	19 “
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169 cases.	

Why the right ear is more frequently affected is not an important question, as the additional fre-

quency of involvement is small, only twelve more cases being attributed to the right than to the left ear, and the absence of notes upon this point renders conclusions doubtful.

Let us first consider, in as concise a form as possible, the subject of the intra-cranial presence of pus, outside of the veins and sinuses, dependent upon an ear disease. This includes, of course, not only brain abscesses, but deposits of pus, in any situation coming under this heading, either in patches, or diffused generally over certain places or spaces.

The importance of this subject may be inferred from Barr's observations, that the deaths in London for one year from brain abscesses, following otorrhœa, were eighty-six; and in the eight principal towns of Scotland were twenty-six.

Barker considers 50 per cent. of all cases of brain abscess to be due to otorrhœa, and his view is shared by von Bergmann. Lebert places the proportion at 25 per cent., while Meyer and Ogle believe it to be about 30.

The starting point and focus of this trouble is the middle ear. It may result from either acute or chronic otorrhœa, with the tendency largely in favor of the latter.

This observation applies to all fatal cerebro-aural affections, and the statistics that I have framed upon this subject are as follows:

Cerebro-aural affections dependent upon chronic otorrhœa	118 cases.
Cerebro-aural affections dependent upon acute otorrhœa	10 "
Not stated	41 "
	<hr/>
	169 cases.

A fair proportion of these ten cases proceeding from acute otorrhœa were instances of brain abscesses. This is especially noteworthy, because many observers discredit the fact that brain abscesses are *ever* produced

from acute otorrhœa, and von Bergmann is especially wedded to this belief. My records show six cases of this character, and the reporters are Bürkner, De Rossi, Knapp, Pooley and Allport. These were strictly cases of brain abscess, starting from acute purulent otorrhœa.

Acute tympanic abscesses have a natural tendency to recovery, even if left entirely to themselves, and favorable results frequently follow even the most disadvantageous circumstances—hence the infrequency of cerebro-aural complications. Chronic otorrhœa, on the contrary, is a much more dangerous condition, and when the proximity of the middle ear, mastoid antrum and cells to the brain and its membranes, and the different sinuses, veins, etc., is considered, it is not singular that such should be the case. It is in chronic otorrhœa that we observe the foul and irritating discharge, either free or retained; also granulations and polypi, necrosis of the ossicles, tympanum, mastoid antrum and cells. Here we find necrotic openings in the walls of these cavities, and encroachment of the disease to the intra-cranial cavity. And here we notice the carrying of the disease to the brain and sinuses by the more insidious process of germ migration, by means of the minute osseous foramina or small blood-vessels that are not infrequently noticed connecting the tympanum, antrum, or cells, with the intra-cranial cavity. Cerebro-aural affections are especially liable to occur when a tympanic discharge has been suddenly stopped, and there can be no doubt that the antiseptic powders now so freely used by insufflation, have precipitated many attacks of this nature. Such powders undoubtedly have their use, but they should be handled with judgment, and should *never* be used in acute otorrhœa, and when employed, the parts should simply be lightly dusted, and not heavily coated.

How does the disease extend from the tympanum, antrum and cells, to the intra-cranial cavity?

Probably the most frequent method of extension is through the roof of the tympanum into the middle cerebral fossa, and from thence to the temporal lobe. In looking over the list of necrotic openings in the temporal bone, as shown by the autopsies in my collection of cases, I find that by far the most frequent location for a necrotic fistula is in this situation. The next most frequent location for such an opening, is through the inner mastoid plate to the posterior cerebral fossa, and from thence to the cerebellum.

These circumstances are quite significant in localizing brain abscesses following otorrhœa, as, if mastoid disease can be eliminated from the case, either by operation or otherwise, the probability is that the abscess is in the temporal lobe.

The disease may extend by necrosis also, through the internal ear, especially by way of the semicircular canals. And it may be directly carried to the brain, even when no necrosis is present, by several methods, as described by Barr.

1. By the foramenæ in the bone, through which pass vessels, nerves, and connective tissue.
2. By the destruction of the two fenestral membranes; in which case the internal ear becomes invaded, after which the only intervening tissue is the perforated lamella of bone, through which pass the fibres of the auditory nerve.
3. Part of the blood supply to the tympanic cavity comes from within the cranium, and the accompanying veins might carry disease to the brain, either by germ migration, or phlebitis.

Inflammation probably passes from the dura to the brain by contiguity of tissue, as there is no direct vascular or lymphatic connection between the two. Usually the abscess is located in the immediate vicinity of the focal point of disease, although this

is not always the case, as it sometimes happens that healthy dura mater and even brain tissue, may intervene between the seat of original disease and the abscess. Under these circumstances infectious micro-organisms probably pass into the circulatory system from the purulent points, or are transported along the connective tissue which envelops the vessels.

The subject of diffused purulent deposits within the cranium, and that of localized abscesses, may be considered practically under one head. Isolated, encapsulated brain abscesses, following aural disease, are not of very frequent occurrence, and when found, have not been demonstrated to possess distinctive diagnostic features that would necessitate separate consideration. Indeed, my statistics only show a record of nine encapsulated abscesses in all the cases.

Almost all cerebro-aural pus deposits are accompanied by more or less meningitis, either simple or purulent. It is usually localized at the focus of disease, and in consequence its most common seat is near the tympanic roof, although it may be much diffused, and even extend down to the membranes of the cord.

Meningitis and other brain diseases do not always follow destruction of the osseous walls of the skull. The dura mater is extremely tough and fibrous in its structure, and often resists for a long period the destructive action of pus, before softening and perforation occur. Indeed, some cases have been found where the tegmen-tympani was congenitally absent, and yet no brain lesions have followed a chronic purulent otorrhœa. Perforation of the dura mater, however, is not at all necessary to the extension of the disease to the brain membranes and brain substance itself.

When purulent meningitis takes place, it more frequently affects the meninges at the base of the brain, than those at the convexity. This is probably

due to the downward tendency of inflammation. The substance of the cortex of the brain usually becomes more or less infiltrated with pus in these cases.

Besides being found in the membranes, pus may be found in almost any part of the brain substance, and is often generally distributed over an entire hemisphere, and sometimes is deposited on the opposite side of the brain from the point of lesion.

Abscesses may be situated in different parts of the brain, and are most frequently found in the temporal lobe and the cerebellum, in the order of their mention. My records show the presence of abscess in the temporal lobe forty times, and in the cerebellum thirty-one, and they are not infrequently found in the middle lobe.

It must be remembered, that while I have recorded 169 cases of intra-cranial diseases following otorrhœa, only ninety-eight of them were recorded as abscesses proper. This magnifies the percentage of abscesses found in the temporal lobe and cerebellum.

Notwithstanding the fact that many brain abscesses are connected with the tympanum, by a fistulous opening through the tegmen-tympani, it is a noteworthy fact, that the *body* of the abscess is not usually located *immediately* above the diseased tympanum. In the event of its being here situated, the roof of the tympanum would be a strong vantage ground for operation, and many abscesses would probably be self-limited, and quiescent in their nature, owing to a spontaneous and natural drainage through the tegmen.

McBride thinks that if the auditory nerve is involved, as shown by the lack of bone conduction, the abscess will probably be found behind the tentorium. Barker concludes that cerebellar abscesses are *always* found at the outer and anterior portion of the cerebellum, near the petrous. This view cannot be sub-

stantiated, for, while it is true, this is by far the most frequent point of lesion, cerebellar abscesses are sometimes found in other parts of the cerebellum, as will be noticed by a perusal of some of the reports of autopsies in my statistics.

Korner considers that children under ten years of age, seldom suffer from cerebellar abscesses, on account of the great distance of the posterior fossa of the skull from the auditory meatus at this age.

Hulke believes that in young people, the abscess is located, usually above the tentorium cerebelli; in older people, below it.

Abscesses are sometimes multiple, connected or unconnected, and this should always be borne in mind, in operative interference, if a thorough opening of an abscess does not lead to recovery.

Brain abscesses are never a primary disease. They are always the result of traumatism, pus contact, or pus migration, and are usually caused from otorrhœa. They affect the white rather than the gray matter, and being usually found in the temporal lobe—in which are neither motor or sensory nerve-tracts—distinct localization symptoms are apt to be conspicuous from their absence. This is equally true of abscesses in the frontal lobe, which may be entirely destroyed, without producing special signs.

Mr. Field says that "The more acute forms of abscess, give rise to the signs usually attributed to meningitis or encephalitis, while the more chronic ones give rise to no symptoms whatever, until the abscess extends sufficiently near the surface of the brain to light up an inflammation of the membranes, when it becomes suddenly revealed. The probability is that chronic abscesses may exist for years without trouble. It is probable also that recoveries from such abscesses have taken place, the pus undergoing fatty degeneration, becomes quiescent, the fat is re-ab-

sorbed, and the fibroid sac shrinks and contracts upon a cretaceous residue."

Abscesses that develop slowly are often encapsulated. Acute abscesses are not usually encapsulated. It is possible that a larger proportion of abscesses are encapsulated than would appear, owing to the possibility of a primary retention of pus within its walls, and a subsequent disintegration of the capsule, with a diffusion of the contents.

The symptoms that may be expected in cerebro-aural pus deposits are often vague and indefinite. This may be attributed to the frequent lack of brain pressure, owing to the many places where pus may lodge, and accumulate, even in large quantities, without materially compressing sensitive brain substance. It may also be due to the fact that brain abscesses following ear diseases, are usually located in lobes containing no sensory or motor nerve tracts, and in consequence enormous destruction of their substance may take place without active symptoms supervening. An explanation may also be found in the fact that a constant draining of the abscess occasionally occurs through the middle ear, or mastoid bone, by spontaneous or operative openings. An abscess may approach in this insidious manner, without sounding a note of warning, until suddenly it will burst into sensitive portions of the brain, and death may occur before one is fully aware of danger, although a majority of these cases have symptoms to which brief allusion may be made.

The patient usually has suffered from a chronic otorrhea. The discharge may be profuse, unaccountable, and uncontrollable, or it may, for some reason, either spontaneously or from injudicious treatment, suddenly materially lessen or nearly cease, and it is under such circumstances that symptoms occur, pointing to brain complications. We note primarily continuous severe pain in the head, focussing in one

particular spot corresponding to the principal seat of lesion, and we would consequently look for pain in the side of the head, in case of a complication of the temporal or middle lobe, and in the occiput when the cerebellum is involved. The pain becomes worse during febrile exacerbations, and pain in the affected ear will also be frequently noticed. The mastoid is often tender, painful and swelled, while nausea and vomiting are often present, and probable constipation of the bowels. Rigors, all the way from a chilly sensation to a pronounced chill may be present, and when seen, should instigate active measures. No positive reliance can be placed on the sudden accession of febrile symptoms, as the same conditions might be found in a case of pure otorrhea, with pus retention.

It is a generally accepted opinion that cerebral abscesses produce a sub-normal temperature. These records hardly endorse this view. A high temperature is recorded eight times, a medium temperature forty-two times, and a sub-normal temperature only twice. In one hundred and fifteen cases the temperature is not mentioned, and in these latter cases it is fair to presume, that the temperature was not a conspicuous feature, or it would have been noted, especially had it been sub-normal. The post-mortem reports show 98 cases where brain abscesses were found, and only two cases, as before mentioned, are recorded where a sub-normal temperature existed. In both these instances, however, it is but fair to observe, a brain abscess was disclosed after death.

The conclusion therefore, is forced upon us, that while a sub-normal temperature *may* be indicative of a brain abscess, when found in such cases, we need not feel that a sub-normal temperature *must* exist, in all cases of brain abscess.

It will be observed also, that a high temperature is recorded only eight times. In these cases, the autopsies did not show brain abscess to be the pre-

dominating feature. Almost invariably, thrombi in different locations, and extensive necroses were the leading post-mortem appearances. From all we can learn, therefore, the temperature and pulse are *moderately* elevated in cases of auro-cerebral abscesses. Occasionally the pulse has been found very sluggish. Toynbee has recorded one case where the pulse beat was from 16 to 20, and Wreden has observed one case where it was only 10 to the minute.

Delirium, partial or complete unconsciousness, vertigo, somnolence, and convulsions are noticed in most cases, and coma is generally one of the last symptoms observed. The different forms of paresis and paralysis are often seen, and are chiefly noticed in the arms, legs, face, lids, and by strabismus, dilatation of the pupils, diplopia, paralysis of the auditory nerve, and incontinence of urine.

Inasmuch as the seventh nerve passes through the tympanum, in the Fallopian canal, parts supplied by it are apt to be paralyzed, when tympanic necrosis is an element in the case.

Attention should be directed to inflammation and paralysis of the optic nerve, as it is a symptom that is not often sought, and one to which some authors attach much importance. It would probably be found oftener if the ophthalmoscope were more frequently brought into requisition, and this instrument should certainly be used when amblyopia or amaurosis are present, as they are occasionally.

Truckenbrod regards aphasia, as a symptom of invasion of the temporal lobe, and Wernicke claims that aphasia indicates a disturbance in the posterior 3d of the 1st left temporal convolution.

It is undoubtedly true that in the cases I have grouped together, aphasia is present *only* in those cases where there was a purulent involvement of the left temporal lobe. The records do not show, however, whether it occurred in the posterior 3d of the

1st left temporal convolution, but it must not be forgotten that distinct abscesses were found by *post-mortems* to be present in 40 temporal lobes, of which a good proportion were on the left side, and in but six of such instances, was aphasia present. This remark does not include those cases of *pus diffusion*, over the temporal lobe.

The question of a differential diagnosis with brain tumor may arise, in the history of such cases. One very important point in enabling us to arrive at a conclusion in such an instance, is the fact that in brain tumor all the symptoms are quite certain to be constant, with an ever increasing tendency to become worse; while in abscess, the symptoms usually become worse during febrile excitement, and have a vacillating course.

Von Bergman says that the nearer the abscess approaches the posterior division of the frontal convolution, the more apt are we to observe strabismus, disturbances of speech, and irritation or paralysis of the facial nerve.

From my review of these 169 cases, I have ascertained the symptoms recorded as occurring in cases where the autopsies have shown the cause of death to have been, the *intra-cranial presence of pus, outside of the veins and sinuses*. They are as follows:

Deafness	9	Aphasia	5
Head pain	38	Stupor	12
Ear pain	16	Somnolence	7
Chills	16	Tinnitus aurium	2
Temp. sub-normal	2	Insomnia	1
“ medium	7	Meningitis	4
“ high	2	Optic neuritis	3
Pulse sub-normal	2	Incontinence, urine	2
“ medium	7	Nausea and vomiting	29
“ high	2	Mastoid tender and swelled	11
Facial cedema	1	Paralysis of limbs	13
“ herpes	1	Pupils contracted	4
Nystagmus	1	“ dilated	4
Neuralgia	1	Strabismus	

Constipation	19	Diplopia	1
Delirium	19	Amaurosis	1
Maniacal	1	Facial paralysis	13
Unconsciousness	9	Amblyopia	1
Convulsions	21	Ptosis	1
Epilepsy	3	Paralysis of auditory nerve	1
Vertigo	13	Episthotonus	1
Coma	29		

I have also prepared a table showing symptoms that occur in *pure* cases of the intra-cranial presence of pus, *uncomplicated* by any lesion of the veins or sinuses. These symptoms do not occur in any other class of cases under consideration.

Deafness.	Incontinence of urine.
Temp. sub-normal.	Paralysis of limbs.
Pulse sub-normal.	Facial œdema.
Maniacal.	Nystagmus.
Epilepsy.	Neuralgia.
Aphasia.	Constipation.
Insomnia.	Amaurosis.
Pupils contracted.	Ptosis.
Pupils dilated.	Tinnitus aurium.
Paralysis of auditory nerve.	

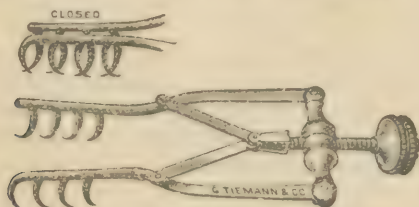
And I have also noticed those symptoms that have occurred in both forms of the disease, but have predominated in those cases where there was an intra-cranial presence of pus, outside of the veins and sinuses. These are as follows:

Coma.	Somnolence.
Convulsions.	Stupor.
Unconsciousness.	Nausea and vomiting.

We now turn to the subject of the treatment of these cases. There is but one resort for an intelligent surgeon, and that is to operate. The question simply is, when to do it and how to do it?

In a case of either acute or chronic otorrhœa with or without mastoid symptoms, where brain phenomena supervene, we should first give the patient the benefit of a doubt by freely opening the drum-head,

both in its lower segment to secure good drainage, and in its upper posterior portion, where pus is prone to lodge. The patient should be kept quietly in bed, and the fountain douche, with very hot water should be allowed to run into the ear every hour during the day, and several times at night. Inflation should be used once or twice a day. A few days may be allowed to elapse—unless extra-dangerous symptoms occur—and if the patient is not then practically better, the mastoid process should be freely opened. As large an opening as possible should be secured. If the mastoid speculum devised by myself be used, the operation will be practically bloodless, and made with much greater facility and certainty.



I feel sure the mastoid should *always* be opened in such cases, before the skull is opened, as there is a very reasonable chance, that the mastoid antrum or cells, may be the focus of disease, and that this operation will suffice. The records that I have compiled show conclusively that in some of the cases, a much better and speedier result would have been obtained had this idea been adopted.

We may find within the process, for instance, caries or necrosis of the inner mastoid plate, or even a fistula, that may solve the whole problem, and render further operative interference unnecessary.

In case a softening of the internal mastoid plate is found, the diseased bone should be gently cut away, and if a perforation is easily made, it should

be accomplished, the aperture enlarged, and the operation concluded in the same general way, as will be described later on.

If the perforation is not quite easily made, the procedures should be stopped at this juncture, and we should await developments.

If a fistula of the inner mastoid plate is found, it should be enlarged, and the operation concluded, as will be subsequently described.

In case the mastoid operation fails to relieve the patient, a perforation of the skull must be made. It may be deemed advisable to again direct our interference to the mastoid plate, in case a fistula has not been found, and if we found necrosis of the inner wall, but did not make a perforation at the first operation.

"Experience alone can tell whether after all it is best to seek for temporal abscesses, directly from the roof of the mastoid process. At all events, it offers the advantage of leaving the entrance of the wound *lower than the abscess*, so that the pus flows off easier, and the skull is not injured, sometimes very advantageous to the patient." (From Von Bergman.)

It is of course, evident that perforation of the inner mastoid plate, is only advisable in those cases where the indications point with reasonable certainty to an involvement of one of the middle lobes of the brain, especially the temporal.

An accurate diagnosis as to the seat of the abscess is of the utmost importance, and the leading points, so far as it is at present known, for such a diagnosis, may, I think, be gleaned from the preceding pages of this article. The two principal objective foci for operation, will be the temporal lobe and cerebellum.

In case we decide to perforate the skull, with the hope of locating an abscess in the temporal lobe, where is the best seat for operation?

This question may sometimes be answered after

the proper flaps have been made, by the finding of an area of softened, necrosed bone, or possibly a fistula. In the event of such a discovery, the operation may be made at this point, the necrosed bone should be removed, and an opening effected, or the fistula should be enlarged.

But in case we are not guided, as before mentioned, the best place for opening is just above, and perhaps a little in front of, the bony meatus, directly over the superior line of the zygomatic arch, the temporal lobe at this point being about $1\frac{1}{2}$ inches wide.

This exposes the dura-mater near the tympanic roof, without wounding the middle meningeal artery, and is about the most dependent portion of the middle cerebral fossa, the squamous bone being exceedingly thin at this point, and easily perforated. The opening may be made with either the drill, chisel, dental engine, or trephine, and should be sufficiently enlarged, and the edges smoothed. Personally, I do not like the chisel, either for this operation or for opening the mastoid process. I do not feel that it is advantageous to an already inflamed process, or brain, to pound it. Salzer suggests that the concussion might cause the rupture of an abscess into the ventricle, or the sub-arachnoid space. I have operated upon 83 cases of mastoid abscess, with the drill, and have had uniformly smooth operations, never having struck the lateral sinus but once, and then experiencing no ill effects from its exposure.

Before the operation, the scalp, for a large area, around the field of operation should be shaved, and thoroughly scrubbed and cleansed antiseptically.

Chloroform should be used instead of ether, as it produces greater quietude, and less cerebral congestion and tension. The auricle should be dissected down, so as to thoroughly expose the position of the bony meatus. It may be held down by an assistant

and suture, and will then be out of the way, and will not interfere with the steps of the operation.

A large circular flap should be made, with a broad base, sufficiently extensive to thoroughly expose the field of operation. This may be held back by an assistant and a suture. The parts may then be held apart by my mastoid speculum, which will also control the bleeding, if the blades are widely separated. If hemorrhage however, should annoy the operator, Lanphear recommends hot (115° Fahr.) water to be applied to the parts, and this should be ready for use during the operation, and must be thoroughly antiseptic.

The pus may be found outside of the dura-mater, and search should be made for it in this location. If found, and the dura appears to be thoroughly healthy, with no bulging or fluctuation, the operation may cease, and future developments awaited. But if pus is *not* found outside of the dura, or when found in this situation the dura appears unhealthy, or bulges or fluctuates, a free incision through it should be made, and the brain itself exposed. Pus may be found just inside the dura. If this proves to be the case, and the brain substance appears healthy, and is not bulging or fluctuating, operations may be suspended; but if pus is not found, or, if found, and the conditions just mentioned are present, and the operator is reasonably sure of his diagnosis, investigations must be pushed into the brain proper.

For exploring the brain, the aspirator, or exploring needle is to be preferred to the knife, and it should be introduced, and re-introduced, again and again, rather than to shove it along, from place to place, in hopes of finding pus. When the abscess is reached, the knife may be used to freely lay it open, at its most dependent portion. This cavity should not be syringed, a thorough opening, and good drainage being sufficient. A few strands of gut, should

be placed into the abscess, as far as can be reached, and the end allowed to hang outside of the head. This can be shortened from day to day.

The dura-mater, and skin flaps, may be sutured at their upper portions, but enough space at the bottom allowed to remain open, to admit of good drainage.

Gut sutures should be employed for uniting the dura-mater, and iodoform dressings should be employed. Lanphear recommends that the head should be kept low after the operation, and it is needless to say that the strictest antiseptic precautions should be maintained.

In case it becomes necessary to attack the cerebellum, the same directions are applicable, and the only question is to ascertain the best point for trephining. The opening should be made in the cerebellar fossa. This disease does not usually occur sporadically in the cerebellum, but spreads backwards, *to* the cerebellum from the usual focus of disease, *viz.*: the petrous and mastoid portions of the temporal bone, in consequence of which the abscess will generally be found in the anterior portion of the cerebellum. We must get at this portion of the brain, to do which the opening must be made one and a half inches back of the middle of the osseous meatus, and one-quarter of an inch below it. The opening, in other words, should be just back of the posterior border of the mastoid process. The lateral sinus would not be touched at this point, and the exploring needle should be directed upward, forward, and inward, to reach pus in the anterior portion of the lateral cerebellar lobe.

Before passing on to a consideration of phlebitis and thrombosis, I beg leave to submit the following tables, compiled from a study of the foregoing cases.

We first have a complete list of the symptoms and conditions occurring in the histories recorded in this

article, and the frequency of their occurrence. They are as follows:

Deafness	11	Temperature high	8
Tinnitus aurium	3	Temperature medium	42
Tympanic necrosis	6	Temperature sub-normal	2
Tympanic granulations	6	Pulse high	6
Tympanic polypus	7	Pulse medium	33
Ear pain	35	Pulse sub-normal	2
Cholesteatoma	3	Sudden rise and fall of temp.	2
Swelling in front of ear	3	Chills	38
Swelling over ear	4	Facial paresis or paralysis	28
Swelling under ear	4	Paresis or paralysis, limbs	19
Mastoid swelled and tender	35	Spasms of limbs	7
Mastoid opened, spontaneously or otherwise	31	Spasms of facial muscle	4
Pus found in mastoid after opening	16	Paralysis of auditory nerve	2
Pus not found in mastoid after opening	7	Suspended breathing	1
Spontaneous mastoid opening	5	Incontinence of urine	3
Wilde's incision made	9	Facial veins enlarged	2
Opening into cranium made either spontaneously or otherwise	21	Optic neuritis	11
Pus found in cranium after opening	16	Amblyopia	5
Edema of eyelids	1	Amaurosis	1
Pupils dilated	8	Syncope	2
Pupils contracted	8	Neuralgia of trigeminus	2
Pupils sluggish	2	Epilepsy	4
Nystagmus	1	Head pain	78
Ptosis	6	Diplopia	2
Exophthalmus	4	Strabismus	10
Delirium	36	Tender spine	1
Aphasia	8	Epistaxis	1
Stupor	18	Diarrhœa	3
Unconsciousness	17	Constipation	11
Coma	39	Pyæmia	4
Convulsions	22	Episthotonus	3
Insomnia	2	Meningitis	10
Somnolence	11	Nausea and vomiting	41
		Facial œdema	2
		Facial herpes	2
		Edema of neck	3
		Maniacal	1
		Vertigo	22
		Fainting	1

I have given this itemized record of symptoms, as they have come to me in the reports. It would seem that the histories must have been given somewhat

inaccurately, as I feel confident that many of the symptoms must have been of more frequent occurrence.

For instance: head pain, ear pain, deafness, tympanic necrosis, etc., must have been present in most of the cases, and yet it is not here recorded. On the contrary, some of the symptoms noted, were so seldom seen and apparently have so little direct bearing on the case, that they can hardly be classed in the symptomatology of intra-cranial disease following aural affections.

As to the results obtained in these cases, the record is as follows: Death, 158; recovery, 11. Total, 169.

We find that in these 169 cases, the skull has been opened spontaneously or otherwise, 21 times. All the 11 recoveries here recorded are contained in these 21 cases after the skull has been trephined, and the brain exposed. This shows a recovery of more than one-half of the cases thus operated. Considering our primitive knowledge of the subject, this record is good, and should encourage us to renewed efforts in the future, especially as operative interference is our only reasonable hope for lessening the mortality.

I will now beg leave to submit an itemized report of the various post-mortem appearances found, and the frequency of their occurrence. They are as follows:

Pus in the dura-mater	1
Pus in the pia-mater	7
Pus in the arachnoid	1
Pus in the superior petrosal sinus	2
Pus in the lateral sinus	5
Pus in the jugular sinus	2
Pus in the sigmoid sinus	3
Pus in the inferior cavernous sinus	2
Pus in the internal jugular vein	1
Pus in the lateral ventricle	4
Pus in the posterior occipital fossa	1
Pus in the middle cranial fossa	1
Pus in the 1st frontal fissure	1

Pus in the fissure of Rolando	1
Pus in the neck	2
Pus around chiasm	1
Pus over temporal lobe	1
Pus over medulla	4
Pus over pons	2
Pus between mastoid and dura-mater	1
Pus around spinal cord	1
Pus on surface of cerebellum	2
Pus between dura-mater and tegmen-tympani	3
Pus generally distributed over side of hemisphere	15
Pus on opposite side of brain to point of lesion	1
Pus in mastoid cells	15
Pus in labyrinth	1
Pus in cochlea	2
Pus in Fallopian canal	1
Pus in Eustachian tube	1
Pus in tensor tympanic canal	1
Pus patches over brain	2
Pus at base of brain	2
Pus at sella turcica	1
Pus on outer surface of frontal convolution	4
Purulent meningitis	11
Purulent bas. meningitis	3
Purulent lepto-meningitis	3
Purulent infiltration of orbit	1
Pus in semi-circular canals	3
Pus in tympanum	22
Pus in vestibule	4
Pus in internal ear	2
Pus in mastoid antrum	5
Pus on outer mastoid surface	2
Pus on outer squamous surface	1
Pus on outer sup. max. surface	1
Abscess in temporal lobe	40
Abscess in middle lobe	7
Abscess in occipital lobe	1
Abscess in frontal lobe	2
Abscess in cerebellar lobe	31
Abscess in pons	3
Abscess in crus cerebelli	1
Abscess in middle cranial fossa	1
Abscess in post. cranial fossa	2
Abscess in 1st frontal convolution	1
Abscess at apex of petrous	1
Abscess beneath dura-mater on outer surface of petrous	3
Diffuse sub-dural abscess	5

Abscess encapsulated	9
Abscess not encapsulated	2
Necrosis of upper part of petrous	10
Necrosis of inner surface of squamous	3
Necrosis of inner table of skull (general)	1
Necrosis of outer surface of mastoid	6
Necrosis of outer surface of occip.	1
Necrosis of outer surface of sup. max.	1
Necrosis of outer surface of frontal	1
Necrosis of outer surface of squamous	3
Necrosis of outer surface of parietal	2
Necrosis of inner surface of mastoid	5
Necrosis of mastoid antrum	6
Necrosis of mastoid cells	11
Necrosis of tympanum	21
Necrosis of tegmen-tympani	16
Necrosis of malleus	1
Necrosis of incus	1
Necrosis of meatus ex.	8
Necrosis of cribriform lamina.	1
Necrosis of jugular fossa	1
Necrosis of cochlea	1
Necrosis of vestibule	1
Necrosis of semi-circular canals.	3
Necrosis of pyramid	1
Necrosis of lateral sinus	5
Necrosis of bony wall of facial canal	1
Necrosis of vertebræ	2
Necrosis of sulcus for lateral sinus	2
Necrosis of bony wall of carotid canal	2
Necrotic opening through roof of mastoid antrum	2
Necrotic opening through squamous	1
Necrotic opening in bony wall of sulcus trans.	1
Necrotic opening in incis. santorini	1
Necrotic opening in sup. pet. sinus	1
Necrotic opening in wall of lateral sinus	2
Necrotic opening in parieto-occip. suture into cranial cavity	1
Necrotic opening in semi-circular canals	2
Necrotic opening in sigmoid flexure.	1
Necrotic opening in posterior wall of meatus	1
Necrotic opening between middle and internal ears.	2
Necrotic opening between internal ear and cranial cavity	2
Necrotic opening between mastoid antrum and sup. pet. sinus	1
Necrotic opening between mastoid antrum and sigmoid sinus	2

Necrotic opening in tegmen-tympani.	13
Necrotic opening through anterior surface of petrous. .	1
Necrotic opening through lower tip of mastoid.	1
Necrotic opening through inner mastoid plate to lat. sinus	5
Necrotic opening through outer mastoid plate.	1
Necrotic opening through inner mastoid plate.	1
Thrombosis in long. sinus.	8
Thrombosis in superior petrosal sinus.	9
Thrombosis in inf. petrosal sinus	2
Thrombosis in sigmoid sinus	1
Thrombosis in lateral sinus	8
Thrombosis in transverse sinus	8
Thrombosis in cavernous sinus	3
Thrombosis in carotid sinus	2
Thrombosis in sub. clav. vein	1
Thrombosis in internal jugular vein	9
Thrombosis in basilar vein	1
Thrombosis in ophthalmic vein	1
Thrombosis in bulb. ven. jug	1
Thrombosis in sigmoid flex	1
Thrombosis in circular sinus of Ridley	1
Phlebitis of lateral sinus	4
Phlebitis of trans. sinus	4
Phlebitis of superior petrosal sinus	1
Phlebitis of ex. jug. vein	3
Phlebitis of mastoid em. vein	1
Phlebitis of ophthalmic veins	1
Dura-mater inflamed	11
Dura-mater perforated	8
Dura-mater adherent to bone	6
Arachnoid inflamed.	2
Pia-mater inflamed	12
Pachymeningitis	1
Bas. meningitis	7
Tuberc. meningitis	3
Meningitis	14
Lepto-meningitis	1
Brain membranes adherent to each other	3
Congestion of all meningeal veins.	1
Hernia of temporal lobe.	1
Gangrene of brain	2
Ossicles gone (all)	7
Malleous gone	6
Incus gone	8
Stapes gone	5
Drum-head gone	12
Drum-head perforated	3

Drum-head not perforated	1
Polypus in tympanum	6
Cholesteatoma in tympanum	4
Epithelioma in tympanum	1
Granulations in tympanum	3
Facial nerve destroyed	5
Facial nerve exposed and imbedded in pus	3
Auditory nerve exposed and imbedded in pus	1
Cholesteatoma of mastoid antrum	2
Granulations of mastoid antrum	2
Cholesteatoma of mastoid cells	2
Mastoid cells sclerosed	5
Mastoid cells obliterated	3
Auricular glands enlarged	1
Sigmoid sinus obliterated	1
Bulb. portion of jug. vein obliterated	1
Mastoid em. vein obliterated	1
Chorda tymp. nerve obliterated	2
Trigeminus nerve obliterated	1
Atrophy of op. nerve	2
Frontal lobe œdematous and soft	1
Adhesions between brain and skull	4
Polypus of external meatus	1
Rupture of sigmoid sinus	1

Having now considered the subject of purulent accumulations within the cranial walls, resulting from otorrhœa, we will turn our attention to "phlebitis and thrombosis of the cerebral veins and sinuses, caused by otorrhœa."

The two subjects of phlebitis and thrombosis may be considered under one head, as the symptoms and conditions are identical, excepting that the evidences of disease are more marked and decided in thrombosis than in phlebitis. The principal sinuses and veins affected are the lateral, cavernous, superior longitudinal, and superior and inferior petrosal sinuses, and the mastoid emissary and facial veins. The parts drained by these sinuses and veins show with tolerable distinctness the seat of the trouble. I will itemize the special local symptoms that follow phlebitis and thrombosis of each of these sinuses and veins.

If the lateral sinus is affected we will be apt to notice tenderness, œdema, and a corded feeling along the course of the internal juglar vein in its course towards the clavicle. Sometimes purulent degeneration of these parts will be seen, while œdema of the parts in and about the external ear, dizziness, and staggering, may be expected.

By union of the two lateral sinuses at the internal occipital protuberance, the difficulty may extend from one sinus to the other, and thereby produce at the opposite side, the same condition existing at the original site of disease.

If the cavernous sinus is affected, we may anticipate œdema of the retina, poor vision, photophobia, œdema around the eye, and in the orbit; œdema of nostrils, forehead, eyelids, and nasal mucus membrane, epistaxis, perhaps exophthalmus, ptosis, sloughing of orbital tissue, paresis or paralysis of the abducens, oculo-motor and trigeminus nerves.

If the superior longitudinal sinus be affected, we may look for epistaxis, epilepsy, convulsions, and vascular engorgement in the cortical substance of the cerebrum, producing unconsciousness.

If the superior or inferior petrosal sinuses be affected, we may expect epistaxis, swelling of veins extending from the anterior fontanelle to the temples, epilepsy, engorgement of orbital vessels, poor vision, photophobia, paresis or paralysis of oculo-motor and abducens nerves, exophthalmus, ptosis, œdema of eye-lids, and sloughing of orbital tissues.

If the mastoid emissary vein be affected, we will usually notice induration of the neck and suppuration of the induration, œdema around mastoid process, tenderness over exit of mastoid emissary and jugular veins, suppuration over the former, œdema of eye-lids, purpuric spots on face and upper part of chest (this is usually one of the latest symptoms)

general head pain, vomiting, coma, convulsions, facial erysipelas, dyspnoea and delirium.

If the facial vein is affected, we expect œdema of face, erysipelatous swelling of cheeks and eye-lids, and possibly vesicles on face.

It will be noticed that some of the symptoms here given, are the same, when different vessels are involved, this being due to the connection existing from one vessel to the other, and in consequence the almost necessary implication of more than one portion of the venous circulation at a time. A correct idea as to the original seat of disease, must be estimated by a review of the different conditions, with a careful elimination of the less predominating symptoms.

Besides these special indications of disease in the various vessels, there are some general symptoms of phlebitis and thrombosis of the cerebral sinuses and veins following otorrhœa, that must not be forgotten.

The general appearance of a patient suffering from this disease, is apt to be quite different from that of a person afflicted with purulent accumulations in the brain cavity. Of course it must not be forgotten that the two conditions may be combined in one case, in which instance, a mixture of both symptoms will be observed. The general appearance of a patient suffering from cerebral pus deposits, pure and simple, is not *active*. The disease kills insidiously; the condition is below par. The temperature and pulse are not much exalted; they may even be sub-normal. If the mental condition is disturbed, it is apt to be in a dull apathetic manner, and the entire appearance is usually one of depression and anxiety.

Phlebitis and thrombosis, on the contrary, induce a different state of affairs, and the patient appears exhilarated, and in a nervous, highly-strung condition. The temperature is never sub-normal, and is apt to be high, with occasional rapid changes from a

medium to a high degree. Chills are of frequent occurrence. Violent delirium is sometimes seen, and the scarlet cheek and brilliant eye, denotes an exalted condition, and a rapid progress towards a fatal termination.

There is one symptom that I find recorded but twice in these 169 cases, where the post mortem each time revealed the same pathological condition. This symptom was a sudden rise and fall of temperature. The autopsy in both instances, showed a thrombosis in the lateral sinus, and internal jugular vein, and while not attaching too much importance to these symptoms and conditions, they should not be entirely forgotten.

I beg leave to here submit a chart with descriptive remarks, that I take the liberty of borrowing from Ballance. It is extremely simple and accurate, and will be found invaluable in elucidating the topography of the brain, skull, etc.

I have tabulated the symptoms occurring where phlebitis and thrombosis were present, and beg leave to submit them.

Head-pain.	12	Optic neuritis	1
Ear-pain	2	Edema of lids.	3
Temp. medium.	4	Diplopia.	1
Temp. high.	3	Facial herpes.	1
Pulse medium	4	Facial paralysis	3
Pulse high	3	Facial veins enlarged.	1
Chills	11	Vomiting and nausea	5
Mastoid tender and swelled	5	Neck swelled and painful	6
Delirium	9	Pyæmia	3
Unconsciousness.	1	Diarrhœa	1
Coma	3	Epistaxis.	1
Stupor.	1	Sudden rise and fall of temp.	2
Somnolence.	1	Exophthalmus.	3
Convulsions.	1	Edema near ear	1
Vertigo	3	Meningitis	1
Strabismus.	2	Edema of uvula.	1
Amblyopia	2		

I have also prepared a table showing symptoms

that occur in *pure* cases of phlebitis and thrombosis, uncomplicated by any brain lesion.

These symptoms do not occur in any other class of cases under consideration :

Œdema of eye-lids
Facial veins enlarged.
Pyæmia.
Diarrhœa.

Epistaxis.
Sudden rise and fall of temp.
Œdema near ear.
Œdema of uvula.

I have also noted the symptoms found in both kinds of cases, viz.: Cerebral pus deposits, and cerebral phlebitis and thrombosis, following otorrhœa, but predominating in the latter. These are as follows :

Chills.
High Temperature.

High Pulse.
Episthotonus.

Records like these are significant, but too much reliance must not be placed upon them, as some of these symptoms may have been incidental only. We must naturally bear in mind in estimating these records, as to symptoms and post-mortem appearances, that some observers are more accurate than others in noting and recording such items, and in consequence the reports may not always be thoroughly correct. It is, however, in a large number of cases, comparatively easy to see the general drift, in favor of certain symptoms, post-mortem appearances, etc. Again, many of the symptoms and post-mortem appearances are not at all significant, and hardly noteworthy. Their infrequent occurrence, and evident irrelevancy, deprive them of importance, and really make them unworthy of consideration. The principal symptoms, and the important seats of lesion should be born in mind, but further than this we need not go.

Phlebitis and thrombosis as heretofore specified, may be caused by direct contact of necrosed bone, with the capsule of the vessel, by contiguity of tissue along the vascular walls, or by means of pus migra-

tion through the small bony foramenæ, or the various vascular supplies.

It may be well, therefore, to briefly glance at some of the essential anatomical points involved in the matter, and for this purpose I take pleasure in referring somewhat to the studies and researches of Green, Bacon and Dana.

A close relationship exists between the cerebral veins and sinuses and the focus of disease in otorrhea. For instance, the veins of the tympanum terminate in the middle meningeal and pharyngeal veins, and pass from thence to the internal jugular vein.

The lower floor of the tympanum separates this cavity from the jugular vein, and is perforated by the glosso-pharyngeal nerve and a minute vessel.

The mastoid cells are separated from the lateral sinus, by a thin osseous wall, which is perforated by minute foramina. It will be remembered, that the veins of the vestibule and semi-circular canals, accompany the arteries, and receiving those of the cochlea, at the base of the modiolus, terminate in the superior petrosal sinus.

There are eight emissary veins passing through the skull, which connect the organs and tissues in the interior of the skull, with those exterior to it. It is not essential that all of these should be mentioned, but the mastoid emissary vein is by far the most important. It emerges from the skull just behind the mastoid process, and furnishes a venous connection, between the lateral sinus and the occipital veins, outside of the skull. It passes through the mastoid foramen, and connects the lateral sinus with the occipital veins, and goes from thence to the internal jugular vein. Greene asserts that, its average position is just behind the posterior limit of the mastoid process, about on a line with the meatus. Its position is important, because it is at this point,

that we may first notice the swelling, pain and tenderness that indicates an involvement of the lateral sinus. The condyloid emissary vein passes through the condyloid canal, and connects the plexus vertebr. cervical., with the lower end of the lateral sinus. The parietal emissary vein passes through the parietal foramen, connecting the veins of the scalp, with the superior sagittal sinus. The occipital emissary vein, passes through an opening in the occipital protuberance, and connects the occipital veins with the sinus near the torcular herophili.

It should also be remembered, that the vascular supply of the scalp, skull, and dura-mater comes from the external carotid, while the vascular supply of the eye, brain, and pia-mater, comes from the internal carotid and vertebral veins.

My records show that the longitudinal, superior petrosal, lateral and transverse sinuses, and internal jugular vein, are affected by phlebitis and thrombosis, with about equal frequency, and that these sinuses and veins are more frequently affected than any others.

From these statistics it does not appear that the lateral is more frequently affected than the other sinuses, as is generally believed. Indeed, the superior petrosal sinus was found thrombotic once more than the lateral sinus, which would lead us to infer that this disease is somewhat more inclined to spread from the middle and internal ears, than from the mastoid cells.

The frequency of involvement of the internal jugular vein, is accounted for by the easy transmission of disease from the middle and internal ear by three channels. One by the tegmen-tympani, another by a small vein passing from the middle ear into the middle meningeal vein, and thence to the internal jugular vein, with still another means of communication by the veins before mentioned passing from

the internal ear, into the superior petrosal sinus, into the lateral sinus, and into the internal jugular vein.

The venous connection between the mastoid cells, and lateral sinus, which in its turn empties into the internal jugular vein, must not be forgotten in this particular, and we therefore infer it to be but natural that the internal jugular vein should be frequently affected, as it is the dumping ground of so many venous channels.

These cases run a variable course, extending from a few hours to several weeks, but the result is usually fatal, although instances of recovery are not rare. I myself have seen several cases, of undoubted phlebitis and thrombosis, of a most severe character, where complete and permanent recoveries have occurred.

Post-mortem examinations have produced frequent cases of brain thrombi, where such a condition was not suspected during life. The explanation of this phenomenon is probably the vicarious action of the rich collateral circulation. Barr reports a case where the autopsy showed complete occlusion of the lateral sinus, by fibrous bands.

Death usually takes place from metastasis, especially by embolic pleura-pneumonia, less frequently by abscess of the liver and kidney, sometimes from pyæmia. We may be sure of a fatal issue, when thrombus of the internal jugular vein is found, with metastasis of the internal organs.

We have gathered that phlebitis and thrombosis of the cerebral sinuses and veins from otorrhœa is not so fatal in its character, as cerebral abscesses, etc., from the same cause, and consequently the indications for operation, are not so imperative. We can often afford to temporize somewhat with it, treat the indications and wait for developments and active indications, before resorting to operative procedures. This is fortunate, as it is difficult to get at the focus

of disease in many instances, and our methods of operation are far from being crystalized.

We may first endeavor to remove the focus of disease in the middle ear. This may be done by opening abscesses, removing granulations, polypi, or necrosed bone, and by the use of quiet, aural douches of hot water, combating any incidental conditions that may arise, and the free use of alteratives, and absorbents, such as mercury and the iodides. If these measures fail, and the symptoms continue or grow worse, the mastoid process should be freely opened, even though no signs of disease be here present.

If now, after awaiting a reasonable length of time, the symptoms show no sign of abating, we must direct our operations directly to the sinus or vein involved. If thrombus of the lateral sinus is found, the internal jugular vein should be tied at two points in the neck, and the intervening vein tissue removed, after which the surrounding parts should be thoroughly cleansed, etc. This procedure is necessary as an obstacle against the passage of the septic material into the general circulation.

The lateral sinus may now be exposed, by opening the skull one inch behind, and a quarter of an inch above the centre of the bony meatus. A free opening should be made, the diseased area thoroughly and antiseptically cleaned, and unhealthy tissue removed, after which it should be packed with iodoform gauze.

Ballance says that after the jugular is tied the face and lips become blue, but that it is only temporary.

Surgical interference upon the other sinuses and veins is not sufficiently crystallized to warrant extended remarks.

